Yardeni Research

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AI For All

Check out the accompanying chart collection.

Executive Summary: The day will come when all companies use AI just as all use the Internet today. The efficiency gains will be profound. Jackie discusses the three main skill sets that AI brings to the table and looks at ways that companies in diverse industries have found to leverage AI to their advantage. … Also: Washington lawmakers have been holding forums and hearings to explore how best to regulate AI usage, with industry execs and the Biden administration participating. … And: Technology industries that are heavily exposed to AI have helped the S&P 500 Tech sector outperform all but one other sector so far this year.

Information Technology I: Everyone's Adopting AI. News headlines are filled almost daily with the latest ways companies are deploying artificial intelligence (AI). Just this week, we learned that Tesla is creating its own GPU chips to power a supercomputer that will train the AI to be used in its fully autonomous vehicles. It's quickly become clear that all companies will adopt AI in some form or another, just as all use the Internet today.

AI has shown its ability to create, analyze large amounts of data, and supply answers and education distilled from vast troves of information far faster than any human could hope to in their wildest dreams. The sheer operating speed at which AI can perform these three sets of tasks holds great potential to make companies of all kinds far more efficient than ever before.

Here's just sampling of the many ways companies have found to leverage AI's three key skill sets:

(1) *AI creates art.* One of the things that makes AI fascinating, albeit creepy at times, is its ability to replicate human creativity. When fed the right information, AI can create movies, develop video games, and edit films, as we discussed in the March 9 *Morning Briefing*.

AI is even being used to make music. Warner Brothers signed Noonoouri, a 19-year-old avatar in the metaverse who has modeled for Dior, appeared in *Elle* and *Vogue*, and signed with top modeling agency IMG Models Worldwide, a September 8 *New York Post* article reported. Most recently Noonoouri released an AI-generated song, "Dominoes," and a

music video. An AI program used the voices of two human musicians, Leonardo Martinelli and Rafa Caivano, who receive royalties from the song.

AI's threat to human jobs is one of the reasons why Hollywood actors are on strike. They're asking for tighter regulation of AI's use in creative projects, among other things. Actors don't want their likenesses used to train AI programs nor do they want be replaced by AI, a July 19 CBS *article* stated. They don't want the studios to be able to scan a background actor, pay them for one day's work, and then use the scan in future projects. The studios say they would only have the right to use the digital copy of the background actor in the picture for which the scan was taken; to use the digital copy again, they'd need the actor's consent.

Marketing campaigns are tapping AI to create text, video, and images for emails, blog posts, social media, chatbots, websites, and SEO content, a September 6 *Forbes* *article* stated. Marketers use ChatGPT for human-like text, Copy.ai for natural language processing, Jasper.ai for copywriting, Peppertype.ai for articles, Lensa for image editing, and DALL-E and MidJourney for image generation.

One example: A marketing video created for the *Forbes* author's Restaurant Furniture Plus business by Synthesia's AI technology. "It was produced in a couple of minutes from a simple copy and paste of our About Us copy on our website without any human involvement or professional actors involved," he stated. The impressive video can be accessed in the article and is worth checking out.

(2) *AI analyzes data.* For years, companies have digitized their operations and collected reams of data. Now they're hoping AI will help them analyze that data and make operations more efficient. Logistics companies, pharmaceutical companies, and even bakers are adopting the technology.

In the logistics arena, Pando has developed a platform that takes "the fire hose of data that [companies] manage and [applies] AI to sync it all together in various ways. The AI can essentially tell companies how to run their logistics differently to boost efficiency and revenue while cutting costs," a September 8 *WSJ* *article* reported. Reliable Robotics is developing autonomous cargo planes that fly with little or no pilot involvement, and Cheetah is developing demand forecasting and inventory prediction systems for restaurants.

The pharmaceutical industry is using AI to accelerate drug development. At LabGenius, a "machine learning algorithm designs antibodies to target specific diseases, and then automated robotic systems build and grow them in the lab, run tests, and feed the data back

into the algorithm, all with limited human supervision," an August 9 *Wired* *article* explained. Meanwhile, Bayer has partnered with Google Cloud's Tensor Processing Units to conduct large quantum chemistry calculations and identify new insights. It will also use Google Cloud's Vertex AI and Med-PaLM2 in clinical trials to improve analysis of the data, a September 4 *Forbes* *article* reported.

The construction industry is sending information from cameras and sensors to AI programs to coordinate when new crews and materials should arrive or to determine when a window's placement doesn't match the project's blueprint, an August 15 *NYT* *article* reported. The Internal Revenue Service is using AI to help it pinpoint which of the nation's largest, most complex partnerships should be examined, a *NYT* *article* on September 8 reported.

Even bakers are using AI. Bimbo Bakeries USA makes Sara Lee cakes, Entenmann's donuts, and Thomas' English muffins in 59 bakeries around the US. It improved its demand forecasting by using an AI model developed by Antuit.ai. The model uses data provided by planners and route operators around the country, as well as more unusual inputs like information about the weather, local events, store inventory, and point-of-sale data, a September 8 *article* in AutomationWorld reported. Now that's sweet!

(3) *AI teaches.* Perhaps the best-known use of AI is as the provider of information, whether via search engine or chatbot. Again, the ability to quickly scan through more information than any human could ever read makes these AI wizards extraordinarily smart, when they aren't *hallucinating* and providing inaccurate information.

JLL developed JLL GPT, a chatbot trained on commercial real estate data that JLL has been collecting for years that now can be used by JLL clients, an August 1 company *press release* stated.

Morgan Stanley and OpenAI developed a virtual assistant that will listen to conversations between financial advisors and their clients and can quickly serve up research or forms discussed or requested, a September 7 Reuters *article* reported. In the future, the virtual assistant should be able to create a meeting summary, draft an email with suggestions on next steps, or schedule a follow-up appointment.

Meanwhile, the Connecticut Department of Education and Varsity Tutors, an online tutoring company, are developing one AI program that will connect students to the right online tutor and another that will design lesson plans. Similar programs are being used in schools in Indiana, Ohio, Texas, Florida, and California, a September 6 *article* in the CT Mirror

reported.

Information Technology II: AI Titans Go to Washington. Washington's legislators are clamoring to be seen as knowledgeable about AI, as they talk about creating legislation that protects the public but doesn't stifle innovation. There are no fewer than four hearings just this week on the subject, and we'd expect many, many more to follow in the months and years to come.

"We see AI as the perfect Washington topic: It is infinitely broad in scope and can fuel endless think tank panel discussions and Congressional hearings without resulting in any new law," wrote Robert Kaminski of *Capital Alpha Partners*. "The momentum to 'regulate AI' looks to us like the same momentum to 'regulate Big Tech' we saw starting in 2017-18, and we carry the same skepticism that any legislation will pass."

Perhaps that's why tech CEOs have acquiesced to testify on multiple occasions. By doing so, they look cooperative yet risk little, as restrictive legislation is unlikely to pass.

The most high-profile hearing occurs today: Senate Majority Leader Chuck Schumer (D-NY) is holding the first in a series of meetings entitled "AI Insight Forum," at which industry executives will examine how to regulate AI and prevent human extinction at the theoretical hands of AI. Tech titans in attendance are expected to include the CEOs of OpenAI, Google, IBM, Meta, Nvidia, and Tesla as well as Microsoft co-founder Bill Gates, a September 11 NBC News *article* reported. There will also be representatives from labor and human rights groups, the CEO of the Motion Picture Association, and the American Federation of Teachers.

Unfortunately, the AI Insight Forum is occurring behind closed doors, without any reason given for excluding the public and the press. Only a post-forum summary and information leaks, if any, will shed light on meeting proceedings.

Another AI-focused hearing titled "How are Federal Agencies Harnessing Artificial Intelligence?" is also being held on Wednesday by the House Oversight subcommittee, led by Representative Nancy Aace (R-SC), with Biden administration tech officials in attendance.

Two AI hearings were held on Tuesday, one focused on how AI companies can boost transparency and the public's trust ("The Need for Transparency in Artificial Intelligence," held by the Senate Commerce and Science subcommittee) and the other on AI oversight

and regulation ("Oversight of AI: Legislating on Artificial Intelligence," held by the Senate Judiciary's subcommittee on technology and privacy).

Information Technology III: A Look at Valuations. Almost every stock of every business even remotely related to AI has performed well so far this year—even if they've sold off from their summer peaks. In fact, the S&P 500 Information Technology sector as a whole rose 47.7% to a July 18 peak only to tumble 9.0% through mid-August before resuming its climb. The sector is up 41.3% ytd through Monday's close, outperforming all other S&P 500 sectors except one.

Here's the performance derby for the S&P 500 sectors ytd through Monday's close: Communication Services (45.0%), Information Technology (41.3), Consumer Discretionary (36.0), S&P 500 (16.9), Industrials (7.1), Materials (5.3), Energy (2.9), Financials (0.2), Real Estate (-1.3), Consumer Staples (-2.5), Health Care (-2.5), and Utilities (-10.8) (*Fig. 1*).

Driving the S&P 500 Information Technology sector's ytd outperformance are a handful of industries: Semiconductors (77.7%), Application Software (49.1), and Systems Software (42.1) with Technology Hardware, Storage & Peripherals (37.3), Semiconductor Equipment (25.6), and Communications Equipment (20.8) not far behind (*Fig. 2*).

Let's take a look at the three best performing tech industries so far this year, all of which have gotten a helping hand from the market's AI ebullience:

(1) *Semiconductors.* You can't talk about semiconductors and AI without talking about Nvidia. The company's stock has risen 209.1% ytd and is less than 10% from its August high. Companies are clamoring to get their hands on Nvidia's AI chips, which the company believes will replace many of the CPU chips in the marketplace. A data center with more than 900-1000 CPU servers can be replaced by just 2 GPU servers, allowing Nvidia customers to save on the cost of server infrastructure, data centers, and energy, said CFO Colette Kress according to a *transcript* of Citi's 2023 Technology Conference on September 7.

Nvidia makes up 57% of the S&P 500 Semiconductor industry's market capitalization. Were it taken out of the industry, the industry's ytd performance would sink to 34.2% from 77.7%, according to Joe's calculations.

Including Nvidia, analysts expect the collective revenue of companies in the S&P 500 Semiconductor industry to fall 2.1% this year and jump 17.1% in 2024, as the industry's

inventory correction appears to have run its course (*Fig. 3*). Earnings are forecast to fall 7.5% this year and to rebound a hearty 36.4% next year (*Fig. 4*). The industry's Net Earnings Revisions Index turned positive in August after 13 months of negative monthly readings (*Fig. 5*). And the industry's forward P/E of 25.9 stands near its recent peak, reflecting investors' restored confidence in the industry's earnings prospects (*Fig. 6*). (FYI: Forward P/Es are based on forward earnings, which is the time-weighted average of analysts' operating earnings-per-share estimates for this year and next.)

(2) *Application Software.* The S&P 500 Application Software industry has risen almost 50% this year yet still stands 17.2% from its highest level of 2021 (*Fig. 7*). Many members of the industry, which includes Salesforce and Adobe, are adding AI to their software offerings, which is expected to catalyze revenue growth to a projected 11.3% this year and 11.0% in 2024 and earnings growth to 24.2% this year and 14.5% next (*Fig. 8* and *Fig. 9*). The industry's forward profit margin (which we calculate from forward revenue and earnings) is at a record-high 28.8%, and net earnings revisions have been definitively positive in recent months (*Fig. 10* and *Fig. 11*). The industry's forward P/E multiple is 30.6, well below where it has been over the past 10 years and roughly twice its expected LTEG forecast (LTEG is the 5-year forward consensus expected earnings growth) (*Fig. 12*).

(3) *Systems Software.* The S&P 500 Systems Software industry stock price index is sitting near a new high, having finally rallied past its 2021 peak level (*Fig. 13*). Forward revenue and earnings per share are expected to continue hit new record levels (*Fig. 14* and *Fig. 15*). Earnings growth is forecast to slow from its torrid paces of 2020 and 2021 but still reach a respectable 8.1% this year and 12.5% in 2024. The Systems Software industry's forward P/E is 29.1, on par with the Application Software industry's forward P/E (*Fig. 16*).

For more information consider reading the Disruptive Technology sections in the following 2023 *Morning Briefings*: *AI Develops Drugs* (July 13), *The AI Job Interview* (April 6), *AI Everything* (March 23), *AI on the Big Screen* (March 9), *AI Copies Your Voice* (March 2), *The AI Race Is On* (February 9), and *Thinking About ChatGPT* (January 19).

Calendars

US: Wed: Headline & Core CPI 0.6%m/m/3.6%y/y & 0.2%m/m/4.3%y/y; Federal Budget Balance -$254b; MBA Mortgage Applications; Crude Oil Inventories & Gasoline Production; IEA Monthly Report. **Thurs:** Retail Sales Total and Ex Autos & Gas 0.2%/0.5%; Headline & Core PPI 0.4%m/m/1.2%y/y & 0.2%m/m/2.2%y/y; Initial & Continuous Jobless Claims

226k/1.69m; Business Inventories 0.1%. (FXStreet estimates)

Global: Wed: Eurozone Industrial Production -0.7%m/m/-0.4%y/y; UK GDP -0.2%m/m/0.4%y/y; UK Headline & Manufacturing Industrial Production -0.6%m/m/0.5%y/y & -1.0%m//m/2.7%y/y; UK Trade Balance -15.9b; UK NIESR Monthly GDP Tracker; Japan Core Machinery Orders -0.9%m/m/-10.7%y/y; Australia Employment Change 24.3k; Australia Unemployment & Participation Rates 3.7%/66.7%; Woods. **Thurs:** Japan Industrial Production -2.0%; China Industrial Production 4.0%y/y; China Retail Sales 3.0%y;y; China Unemployment Rate 5.3%; ECB Interest Rate Decision & Deposit Facility Rate 4.25%/3.75%; NBS Press Conference; Lagarde; Enria; McCaul; Fernandez-Bollo. (FXStreet estimates)

Strategy Indicators

S&P 500 Buybacks (*link*): S&P 500 quarterly buybacks fell 18.8% q/q during Q2-2023 to a 10-quarter low of $174.9 billion from a three-quarter high of $215.5 billion during Q1-2023. That's 37.8% below its record high of $281.0 billion during Q1-2022, but remains well above its 22-quarter low of $88.7 billion during Q2-2020, when companies were seeking to preserve cash amid the highly uncertain economic outlook caused by Covid-19. The four-quarter sum of buybacks fell 5.2% q/q to $812.5 billion during Q2-2023 in the fastest pace of decline since Q4-2020 and is down 19.2% from its record high of $1.005 trillion during Q2-2022. As a percentage of the S&P 500's total market capitalization, buybacks tumbled down to a 10-quarter low of 0.47% in Q2-2023 from 0.63% in Q1-2023. That's up from an 11-year low of 0.35% during Q2-2020, and compares to a 29-quarter high of 1.06% in Q4-2018 and the record high of 1.28% during Q3-2007.

S&P 500 Sectors Buybacks (*link*): Information Technology was the only one of the 11 S&P 500 sectors to have buybacks rise q/q during Q2-2023, as many companies in the other sectors chose to conserve cash on expectations of an economic slowdown. That was the lowest sector count since Q2-2020 during the pandemic, when Communication Services was the only sector to rise. Tech's buyback amount was at a two-quarter high, as five of the other sectors dropped to 10- to 12-quarter lows. Tech accounted for 26.9% of the S&P 500's buybacks in Q2-2023 and has led all sectors since Q3-2017 in every quarter except Q1-2023, when it was edged out by Financials. Tech placed ahead of Financials (18.7%), Energy (10.4), and Consumer Discretionary (10.1) during Q2. Communication Services was the most prolific share repurchaser during Q2, as companies in that sector repurchased 0.81% of their market capitalization, followed by Financials (0.71%), Consumer

Discretionary (0.45), and Tech (0.45, a 14-year low).

US Economic Indicators

NFIB Small Business Optimism Index (***link***): "With small business owners' views about future sales growth and business conditions discouraging, owners want to hire and make money now from strong consumer spending," said NFIB Chief Economist Bill Dunkelberg. "Inflation and the worker shortage continue to be the biggest obstacles for Main Street." August's *Small Business Optimism Index* (SBOI) took a step back this month, dipping 6 points to 91.3 after climbing the prior three months by 2.9 points, to an eight-month high of 91.9. That marks the 20th consecutive month that the index was below its 49-year average of 98.0, not having exceeded the average since December 2021. In August, three of the 10 components increased, five decreased, and two were flat—plans to increase employment (17%) and now is a good time to expand (6). Earnings trends (+5ppts to -25%) posted the biggest gain in August, followed by plans to increase inventories (+2 to 0%) and expected credit conditions (+2 to -6). The biggest drags on the SBOI last month were expect the economy to improve (-7ppts to -37%), plans to make capital outplays (-3 to 24), sales expectations (-2 to -14), current job openings (-2 to 40), and current inventory too low (-1 to -5). Quality of labor (24) is small business owners' *single biggest business problem*, with that and inflation (23) seesawing between number one and number two for several months; rounding out the top five are taxes (17), cost of labor (8), and government requirements (8). The net percentage of owners raising selling prices climbed to 27% this month after sinking to a 29-month low of 25% in July; it was at a near-record-high 66% last March. The net percentage of owners *planning to increase selling prices* climbed to 30% in August after slipping from 31% to 27% in July—up from its recent low of 21% in April. It was at a record high of 54% during November 2021. A net 36% of owners reported *raising compensation* last month, down from 38% in July and back down at June's 25-month low; it was at 46% the first two months of this year and at a record-high 50% at the start of 2022. A net 26% of owners *plan to increase compensation* in the next three months, up from 21% in July, which matched April's two-year low. The percentage is 6ppts below October 2022's 32%, which matched the record high posted the final two months of 2021.

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