MORNING BRIEFING
February 2, 2023

All About Tech & Productivity

Check out the accompanying chart collection.

Executive Summary: Robotics and artificial intelligence are transforming myriad companies in multiple industries—allowing producers and service providers alike to work more efficiently, become more agile, and make up for productivity lost through repeated hiring and training in this tight job market. Rising adoption of robotics and AI solutions over time should drive gains in corporate productivity and mitigate businesses' labor challenges. After all, robots never sleep! Jackie reports on some of the innovative ways that companies in various industries are putting tireless robots to work.

Disruptive Technologies: Robots Increase Their Range. Robots aren't just for factories anymore. They're shuttling packages around warehouses, flying through the air to make online deliveries, flipping burgers, killing weeds with surgical precision, and helping hospital patients with rehabilitation. We've been tracking the rollout of robots and artificial intelligence (AI) for years and see more industries than ever using robots to work smarter and more effectively, with increased efficiency, productivity, and agility.

Spending specifically on robots and AI isn't broken out in capital spending data; however, spending on information processing equipment and software is reported—and has climbed 28.4% since the start of 2020 to near-record levels (*Fig. 1*). As a result, spending on technology as a percentage of total capital spending has risen to 50.5% in Q4-2022 from 46.1% in Q4-2019 (*Fig. 2*).

Despite soaring tech spending and reports of widespread corporate robot and AI adoption, productivity hasn't improved as one might expect. During Q3-2022, productivity increased 0.8% q/q (saar) and fell by 1.3% y/y (*Fig. 3*). (Q4 data will be released this morning.) The surge of employees quitting their jobs for better pay in 2022 likely hurt productivity last year, as employers needed to hire and train new employees. But we remain optimistic that productivity will improve in the quarters and years to come as more companies adopt robotics and AI to counter tight labor markets and rising wages.

The surge of innovation and the lack of a corresponding increase in productivity was called out by Fed Governor Lisa Cook in a November 30, 2022 speech on the US economy and productivity: "[I]t is heartening to see all the innovation happening in the motor vehicle industry and throughout the economy. It is hard to know exactly when all the benefits will show up [in the productivity numbers], but we know the historical evidence suggests they are coming," she said. "History has shown that major innovations take years for their effects to be fully manifested. Firms have to reorganize production—including changing the layout of plants, rethinking management, and reshuffling workers—to maximize their talents."

While we wait for productivity improvements to show up in the data, let's look at some anecdotal evidence that companies of all stripes are adopting robotics and AI to make their widgets and provide their services more efficiently and with less labor:

(1) *Robots in mining.* At Rio Tinto's Gudai-Darri mine in Australia, iron ore is being hauled by autonomous trucks, tailed by autonomous water carts used to control dust, and shipped from mines to docks for export via a driverless train. While there are humans at the mine, it's the 70 people sitting at a control center in Perth, 1,000 miles away, who are controlling the vehicles. Rio Tinto says it had no need to lay off workers to make room for the autonomous vehicles because it has been short workers.

"Turning trucks and other equipment into robots eliminates breaks for meals or shift changes. It can lower fuel usage by 10% to 15%, according to consulting firm McKinsey & Co., and reduces tire wear. It can also remove people from some dangerous tasks, improving safety," a July 11, 2022 *WSJ* *article* reported.

(2) *Robots in restaurants.* With wages rising and workers scarce, restauranteurs have been trying out all manner of robots.

Chipotle Mexican Grill's test robot "Chippy" works the fry basket. It's made by Miso Robotics, which also produces Flippy, a robotic arm that deep fries as well as flips burgers. White Castle plans to install more than 100 Flippy arms, a December 27, 2022 CNBC *article* reported. Our October 28, 2021 *Morning Briefing* highlighted Buffalo Wild Wings' use of Miso's Flippy Wings, a robotic chicken-wing fryer, and our August 25, 2022 *Morning Briefing* reported on Picnic Works' automated pizza-assembly system. Spyce's salad-making automation equipment has been purchased by Sweetgreen for two locations.

More recently, restaurants have started using AI to take customers' orders. Some Panera Bread and Hardee's locations are using OpenCity's Tori, which accepts orders at the drive-thru, enters the order into the register, and passes it on to the kitchen, a January 15 Fox News *article* reported. Tori has "cognizant and natural conversations" with customers, even those who have accents and speech disabilities or speak foreign languages. If there's a communication problem, a human intervenes.

Newk's Eatery, a fast-casual restaurant chain, is using AI technology from Kea to answer phone orders, ensuring that callers can get through and freeing up workers. Kea's cloud-based system takes incoming calls, transcribes, upsells, processes payments, and sends orders to the restaurant's POS system, a January 26 *article* in *Nation's Restaurant News* reported. The company plans eventually to use AI to automate inventory and purchasing systems and create team schedules. As the technology improves, it should be able to analyze sales mix and product costs and to optimize menus for profitability and guest preference, the article stated.

Expect this trend to continue. "In a Technomic survey conducted in the third quarter, 22% of roughly 500 restaurant operators said they are investing in technology that will save on kitchen labor and 19% said they've added labor-saving tech to front of house tasks such as ordering," CNBC reported.

(3) *Robots in warehouses.* Amazon's highly automated warehouses are not alone: Thousands of other warehouses use robots to increase productivity and reduce headcount. "Spending in the global logistics robotics market, which was valued at roughly $2.6 billion in 2020, is expected to grow at a compound annual growth rate of 22.94%, reaching an estimated $10.97 billion by 2027," reported a December 6, 2022 *WSJ* *article* citing data from Research and Markets.

Locus Robotics has robots that work with human pickers in more than 230 warehouses globally, the company's *website* states. Software summons a robot to an aisle, and a human reads its screen, picks requested items off the shelves, and puts them in the robot's bin. The robot brings the items to a packing area, where humans take over. Locus says its robots increase productivity by two to three times. And they can be deployed in existing warehouses, reducing the capital investment required for adoption. Customers can even lease Lotus robots for extra help during the busy holiday season.

We discussed the use of robots to load and unload containers in our February 3, 2022 *Morning Briefing*. Stretch is a large robot made by Hyundai Motor Group's Boston Dynamics unit. Its crane-like arm unloads boxes from shipping containers or trucks. But Stretch is picky. (Pun intended!) It is limited to unloading boxes that are relatively uniform, weigh less than 50 pounds, and are stacked on the floor. DHL's contract-logistics unit plans to roll out 20-30 of the robots during H1-2023, an October 15, 2022 *WSJ* *article* stated.

(4) *Robots making deliveries.* Restaurants, grocery stores, drug stores, and Amazon are using robots to expedite deliveries. Chipotle has invested in *Nuro*, a startup that uses self-driving technology to deliver groceries in a small electric vehicle, while Starship Technologies makes deliveries on the George Mason University campus in a small container resembling a beach cooler on wheels.

Drones are being used to deliver small packages over short distances. Zipline *delivers* packages for Walmart in Arkansas. DroneUp is expected to provide delivery services for 34 Walmart stores in Arizona, Arkansas, Texas, and Florida and has plans to expand to six states, a May 24, 2022 Walmart *press release* stated. Drone Express *delivers* Papa John's pizzas in Georgia. Alphabet Wing is making drone deliveries for Walgreens in Texas, and Amazon has its own drones that make deliveries in Texas and California, a January 5 CNET *article* reported.

(5) *Robots in hospitals.* Hospitals are using robots for activities that range from delicate surgeries to disinfecting rooms. Intuitive Surgical's DaVinci system makes surgeries less invasive, assisting doctors in procedures such as cardiac surgeries, colorectal surgeries and head, neck, and thoracic surgeries. Robots also assist in patient rehabilitation. The Food and Drug Administration has cleared the Atalante exoskeleton by Wandercraft to help stroke patients relearn to walk. It should be available in Q1, a January 23 Engadget *article* reported.

Relay Robotics' robots deliver lab tests, medical supplies, and other items around the long corridors of a hospital; they also make deliveries in hotels. Akara Robotics' robots disinfect hospital rooms, sometimes by using a UV light and sometimes by purifying the air, a January 9 Innovation Origins *article* reports.

Outside of hospitals, Walgreens Boots Alliance is using robotic arms in its micro-fulfillment centers to dispense about 900 different drugs. Each robotic arm can fill 300 prescriptions an hour, or what a typically staffed Walgreens pharmacy could do in a day. By 2025, half of Walgreens' prescription volume from stores could be filled at these automated centers, freeing up store pharmacists to provide healthcare services to customers, a March 30 CNBC *article* reported. The company plans to build 22 of these facilities to serve more than 8,500 Walgreens stores.

(6) *Robots on the farm.* Old MacDonald would be shocked at the technology farmers are employing to reduce their labor costs and boost yields. Smart machines are making planting, harvesting, and tending to the fields easier, while apps are helping farmers care for

their animals.

John Deere's ExactShot *machine* detects and douses individual seeds with a targeted burst of fertilizer instead of the indiscriminate spraying of traditional machines—reducing fertilizer use as much as 60%. The company's See & Spray machine can differentiate between a weed and a desired plant, spraying herbicides only where needed. Deere has also developed electric and autonomous tractors.

Robots with improved sensors can identify when fruits and vegetables are ripe and gently pick them. We *discussed* Traptic's pickers with their 3D cameras, robotic arms, and neural networks in 2020. Last year, the company was *acquired* by Bowery Farming, which will use the equipment in its indoor, vertical farms. Naïo Technologies has built Ted, Jo, Oz, and Orio, *machines* that weed fields autonomously.

Drones are being used to monitor crops, and companies such as *AppsforAgri* have sensors that can track everything from soil moisture to a cow's health. A September 20 Plug and Play *article* describes the "connected cow," with sensors able to provide real-time monitoring of milk quality and cow health. Virtual fences can move animals wearing sensors from one area of a pasture to another, and 12% of dairy farms are using robots, the article reports. Wonder what the cows think of all this technology?

Additional Reading

Farms & Mines:
Sept. 20, 2022 *Livestock farming technology in animal agriculture*
July 11, 2022 *Miners are relying more on robots. Now they need workers to operate them*

Restaurants:
Jan. 26, 2023 *Newk's Eatery adds AI "cashier in the cloud' to take to-go orders*
Jan. 15, 2023 *Meet Tori, AI for your fast food order*
Dec. 23, 2022 *Robots are replacing workers lost in the pandemic. They're here to stay.*
Dec. 27, 2022 *Why restaurant chains are investing in robots and what it means for workers*

Warehouses & Deliveries:
Jan. 5, 2023 *Drones are already delivering pizza, if you haven't noticed*
Dec. 6, 2022 *Leased robots roll in to help logistics firms handle holiday crush*
Oct. 15, 2022 *Meet the army of robots coming to fillin for scarce workers*
Sept. 7, 2022 *The supply chain broke. Robots are supposed to help fix it*.

Health Care:
Jan. 23, 2023 *FDA clears Wandercraft's exoskeleton for stroke patient rehab*

Jan. 9, 2023 *With Akara robots, hospitals get disinfected faster*
March 20, 2022 *Walgreens turns to robots to fill prescriptions, as pharmacists take on more responsibilities*

Robots & Productivity:
Jan. 26, 2023 *How robotic process automation (RPA) can drive enterprise productivity*
Jan. 26, 2023 *Work productivity is stagnating; do we expect too much from new technologies*
Jan. 21, 2022 *Robot productivity: How cobots compare to humans*

YRI on Robots & AI:
Jan. 12, 2023 *Financials, Materials & Robots*
Jan. 5, 2023 *China, Staples & Drones*
Aug. 25, 2022 *Industrials, Russia & Robots*
April 14, 2022 *Inflation, Semis, Banks & Grocery Shopping*
Feb. 10, 2022 *What's in style?* (Softer, Gentler Robots)
Feb. 3, 2022 *Coming Home*
Dec. 16, 2021 *Will 2022 Be Better Than 2021?* (Autonomous Trucks Arrive)
Oct. 28, 2021 *Margins, FAANMGs, and Batteries*
Sept. 23, 2021 *Natural Gas & Unnatural Exosuits*
June 17, 2021 *Earnings FAANGs & Robots*
Jan. 7, 2021 *Socialism, Materials, and Drones*

Calendars

US: Thurs: Productivity & Unit Labor Costs 2.4%/1.5%; Factory Orders 2.3%; Initial & Continuous Jobless Claims 200k/1.677m; Natural Gas Storage. **Fri:** Payroll Employment Total, Private, and Manufacturing 185k/190k/6k; Average Hourly Earnings 0.3%m/m/4.3%y/y; Average Weekly Hours 34.3; Unemployment Rate 3.6%; ISM NM-PMI 54.5; Baker-Hughes Rig Count. (Bloomberg estimates)

Global: Thurs: Germany Trade Balance €9.2b; China NM-PMI 51.6; ECB Interest Rate Decision 3.00%; BOE Interest Rate Decision 4.00%; BOE Meeting Minutes; Lagarde; Bailey. **Fri:** Eurozone, Germany, and France, C-PMIs 50.2/49.7/49.0; Eurozone, Germany, and France, NM-PMIs 50.7/50.4/49.2; Eurozone PPI -0.4%m/m/22.5%y/y; France Industrial Production 0.2%; UK C-PMI & NM-PMI 47.8/50.7; Elderson; Pill. (Bloomberg estimates)

Strategy Indicators

Stock Market Sentiment Indicators (*link*): The Bull-Bear Ratio climbed for the fourth week this week to 1.73—the highest since early January 2022—after falling the prior three weeks from 1.37 to 1.08. *Bullish* sentiment rebounded to 47.1% this week, the highest since the final week of 2021, after falling from 46.5% to 45.1% last week, outnumbering bears for 11th consecutive week. Meanwhile, *bearish* sentiment retreated for the fourth week from 33.8% to 27.2%, the lowest since early February 2022 and far below the 44.1% reading in early October last year. The *correction count* slipped to 25.7% this week after rising from 23.9% to 26.7% last week, remaining well below its late September 2022 peak of 40.3%. Turning to the *AAII Sentiment Survey* (as of January 26), optimism about the short-term direction of the stock market fell from a nine-week high, while pessimism rose from an 11-week low and neutral sentiment fell—but remained above its historical average. The *percentage expecting stock prices to rise* over the next six months fell to 28.4% after rebounding the prior two weeks by 10.5ppts (to 31.0% from 20.5%) to its highest percentage since November 17, 2022's 33.5%. It remained below its historical average of 37.5% for the 56th consecutive week, but for the second straight week is no longer at an unusually low level. The *percentage expecting stocks to fall* over the next six months rose 3.6ppts to 36.7%, after falling the prior four weeks from 52.3% to 33.1%—the first time it's been below 40% on three consecutive weeks since August 2022. Pessimism remained above its historical average of 31.0% for 59 of the past 62 weeks. The *percentage expecting stock prices will stay essentially unchanged* over the next six months slipped to 34.9% from 36.0% in each of the prior two weeks. It was above its historical average of 31.5% for the fourth straight week—the longest streak since a five-week stretch in March and April of last year.

S&P 500 Earnings, Revenues, Valuation & Margins (*link*): The S&P 500's forward profit margin was unchanged last week at a 21-month low of 12.5%. That's down 0.9ppts from its record high of 13.4% achieved intermittently from March to June. Since the end of April 2020, it has exceeded its prior record high of 12.4% in September 2018. It's now up 2.2pts from 10.3% during April 2020, which was the lowest level since August 2013. Forward revenues was down 0.1% w/w to 0.3% below its record high in mid-October. Forward earnings fell 0.5% w/w and is 5.4% below its record high in mid-June. Both had been steadily making new highs from the beginning of March 2021 to mid-June; prior to that, they peaked just before Covid-19 in February 2020. The consensus expectations for forward revenues growth dropped 0.1ppt w/w to a 31-month low of 2.6%. 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. Forward earnings growth dropped 0.5ppt w/w to a 31-month low of 3.5%. That's down from its 23.9% reading at the end of April 2021, which was 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 11.5% (unchanged w/w) in 2022 and 2.3% in 2023 (unchanged w/w) compared to the 16.5% gain reported in 2021. They expect earnings gains of 7.4% in 2022 (unchanged w/w) and 1.8% in 2023 (down 0.5ppt w/w) compared to an earnings gain of 50.5% in 2021. Analysts expect the profit margin to drop 0.5ppt y/y to 12.4% in 2022 (unchanged w/w) compared to 12.9% in 2021 and to remain flat at 12.4% in 2023 (unchanged w/w). The S&P 500's weekly reading of its forward P/E rose 0.3pt w/w to an eight-week high of 17.8. That's up from a 30-month low of 15.3 in mid-October and is down from a four-month high of 18.2 in mid-August. It also compares to 23.1 in early September 2020, which was the highest level since July 2000 and up from a 77-month low of 14.0 in March 2020. The S&P 500 weekly price-to-sales ratio rose 0.05pt w/w to a six-week high of 2.22, up from a 31-month low of 1.98 in mid-October. That's down from a four-month high of 2.38 in mid-August and also compares to a record high of 2.88 at the end of 2021 and a 49-month low of 1.65 in March 2020.

S&P 500 Sectors Earnings, Revenues, Valuation & Margins (*link*): Looking at the 11 S&P 500 sectors, last week saw consensus forward revenues rise for six sectors and forward earnings rise for one sector. The forward profit margin fell w/w for six sectors and rose for none. Nearly all of the sectors are below recent record highs in their forward revenues, earnings, and profit margins. This week, Consumer Staples and Health Care are the only sectors with forward revenues at a record high, and Consumer Staples is the only sector with forward earnings at a record high. Forward earnings for Financials, Industrials, and Utilities still remains close to their recent record highs, but Energy's is quickly giving up its gains since its record high in October. Since mid-August, all sectors have seen forward profit margins retreat from their record highs. Those of Energy, Industrials, and Tech remain close to their post-pandemic highs. Only three sectors posted a higher profit margin y/y during 2020: Consumer Staples, Tech, and Utilities; during 2021, all of the sectors but Utilities posted a y/y improvement. Energy and Industrials are the only two sectors expected to see margins improve y/y for full-year 2022, followed by these five sectors in 2023: Communication Services, Consumer Discretionary, Financials, Industrials, and Utilities. Here's how they rank based on their current forward profit margin forecasts along with their record highs: Information Technology (23.9%, down 0.1ppt w/w to a 33-month low and down from its 25.4% record high in June 2022), Financials (17.6, unchanged w/w at a 22-month low and down from its 19.8 record high in August 2021), Real Estate (17.2, down 0.1ppt w/w and down from its 19.2 record high in 2016), Communication Services (14.0, down 0.1ppt w/w to a 25-month low and down from its 17.0 record high in October 2021), Utilities (13.7, unchanged w/w at a 22-month low and down from its 14.8 record high in April 2021), Energy (12.1, unchanged w/w at a three-month low and down from its 12.8 record high in November), S&P 500 (12.5, unchanged w/w at a 21-month low and down from its record high of 13.4 achieved intermittently in 2022 from March to June), Materials (11.3, down 0.1ppt w/w to a 23-month low and down from its 13.6 record high in June), Health Care (10.0, unchanged w/w at a 32-month low and down from its 11.5 record high in March), Industrials (10.0, down 0.1ppt w/w to an 18-month low and down from its 10.5 record high in December 2019), Consumer Discretionary (7.1, down 0.1ppt w/w to a 33-month low and down from its 8.3 record high in 2018), and Consumer Staples (7.1, unchanged w/w at a 56-month low and down from its 7.7 record high in June 2020).

S&P 500 Sectors & Industries Forward Profit Margin Since Peak (*link*): Since the S&P 500's forward profit margin peaked at a record-high 13.4% during the June 9 week, it has fallen 7.2% to 12.5% through the January 26 week. The drop has been paced by five of the 11 sectors, though all but the Energy sector is down since the peak. Here's the sector performance since the June 9 peak: Energy (up 1.4% to 12.1%), Utilities (down 1.0% to 13.7%), Consumer Staples (down 2.7% to 7.1%), Industrials (down 3.6% to 10.0%), Real Estate (down 4.2% to 17.2%), Information Technology (down 5.9% to 23.9%), S&P 500 (down 7.2% to 12.5%), Financials (down 7.6% to 17.6%), Consumer Discretionary (down 7.9% to 7.1%), Health Care (down 8.9% to 10.0%), Communication Services (down 13.1% to 14.0%), and Materials (down 16.7% to 11.3%). These are the best performing industries since the June 9 peak: Oil & Gas Refining & Marketing (up 56.7% to 5.3%), Wireless Telecommunication Services (up 53.3% to 10.4%), Airlines (up 25.7% to 5.1%), Casinos & Gaming (up 20.4% to 2.7%), Oil & Gas Equipment & Services (up 17.0% to 10.8%), and Hotels, Resorts & Cruise Lines (up 14.0% to 11.3%). The worst performing industries since the June 9 peak: Commodity Chemicals (down 39.2% to 6.2%), Alternative Carriers (down 38.9% to 5.3%), Copper (down 36.4% to 12.3%), Home Furnishings (down 36.2% to 5.7%), Household Appliances (down 32.8% to 4.5%), and Homebuilding (down 31.2% to 10.4%).

S&P 500 Q4 Earnings Season Monitor (*link*): The Q4-2022 earnings season is off to a poor start, assessed by the four surprise metrics we measure for both earnings and revenues. Revenue and earnings surprises are deteriorating q/q due to the slowing economy, higher costs, and currency translation. With just 38% of S&P 500 companies finished reporting for Q4, revenues are ahead of the consensus forecast by just 1.0%, and earnings have exceeded estimates by 2.3%. The surprises are tracking to be the weakest since Q3-2013 for earnings and since Q1-2020 for revenues. At the same point during the Q3 season, revenues were 1.1% above forecast and earnings had beaten estimates by 2.4%. For the 190 companies that have reported Q4 earnings through mid-day Wednesday, the aggregate y/y revenue and earnings growth rates have slowed considerably from their readings of Q2-2021 to Q3-2022. The collective y/y revenue gain for the 190 reporters so far has slowed from double-digit percentage gains in the prior seven quarters to 6.8%, and earnings are up just 4.5% y/y as higher costs and increased loan loss provisions continue to pressure profit margins. Just 66% of the Q4 reporters so far has reported a positive revenue surprise, and 68% has beaten earnings forecasts. Those are the weakest readings since H1-2020. Furthermore, significantly fewer companies have reported positive y/y earnings growth in Q4 (62%) than positive y/y revenue growth (72%). These figures will change markedly as more Q4-2022 results are reported in the coming weeks, particularly from non-financial firms with greater exposure to the strong dollar. While we expect y/y revenue growth rates to remain positive in Q4, earnings are expected to decline for the first time since Q2-2020.

US Economic Indicators

ADP Employment (*link*): January payrolls missed expectations, rising a smaller-than-expected 106,000 (vs 170,000 expected), while December's (to 253,000 from 235,000) gain was revised higher by 18,000. "In January, we saw the impact of weather-related disruptions on employment during our reference week. Hiring was stronger during other weeks of the month, in line with the strength we saw late last year," noted Nela Richardson, chief economist, ADP. Total payrolls reached a new record high in January, led by a 109,000 increase in service-providing industries, also to a new record high, while goods-producing payrolls fell 3,000 from December's record high. Within *service-providing* industries, leisure & hospitality (+95,000) posted the largest gain, followed by financial activities (+30,000), education & health services (+12,000), professional & business services (+8,000), and information services (+5,000); trade, transportation & utilities saw a 41,000 drop in jobs. *Goods-producing* industries saw a 23,000 increase in manufacturing payrolls, while construction (-24,000) and natural resources & mining (-2,000) industries saw cutbacks. Turning to ADP's median *annual pay* measures, the yearly rate for *job-stayers* held at 7.3% in January, down from September's 7.8% peak, while *job-changers* ticked up from 15.2% to 15.4%, a percentage point below its peak in mid-2022.

JOLTS (*link*): *Job openings* remained at a high level in December, rebounding 572,000 to 11.0 million, after a two-month drop of 247,000. For all of 2022, job openings climbed 436,000 from last December's 11.4 million; it was at a record-high 11.9 million last March. There were 5.7 million unemployed in December, so there were 1.9 available jobs for each unemployed person that month, up from 1.7 the prior two months. By industry, the *biggest* *increases* occurred in accommodations & food services (+409,000)—which had posted the biggest decline in November—followed by retail trade (+134,000), construction (82,000), and wholesale trade (+73,000), while the *biggest declines* were in information services (-107,000), manufacturing (-39,000), and transportation, warehousing & utilities (-31,000). *Hirings* rose 131,000 in December to 6.2 million after falling two of the prior three months by 300,000; hirings were at 6.8 million last February. Meanwhile, the number of quits fell 15,000 last month to 4.1 million, hovering around that level for the last half of 2022. Quits were at a record-high 4.5 million during November 2021.

Construction Spending (*link*): Construction spending remains stalled at record highs, dipping 0.4% in December following a 0.5% gain in November and no change in October. Spending rose 7.3% during the first half of 2022 and only 0.3% during the second half. *Private construction* spending follows a similar pattern, slipping 0.4% in December following a 0.5% gain and a 0.4% loss the prior two months, posting an 8.5% gain during H1 and a 1.7% loss during H2. *Public construction* spending fell 0.4% in December, following a six-month gain of 10.6%. Within private construction spending, residential investment contracted for the seventh successive month since reaching a record high in May, slumping 9.3% over the period, after not posting a decline since May 2020. The recent weakness in *residential* investment was driven by *single-family* construction spending, which hasn't recorded a gain since last April, plunging 20.1% during the eight months through December. Meanwhile, *multi-family* construction posted big gains during the final months of last year, soaring 19.2% during the five months ending December to a new record high. Meanwhile, *home improvement* spending recovered 1.7% the final two months of last year after sliding the prior three months by 8.7%—expanding 20.4% y/y. December's level was 7.1% below last July's record high. *Private nonresidential* spending dipped 0.5% in December after a seven-month surge of 14.7% to a new record high in November.

US Manufacturing PMI (*link*): ISM's January M-PMI contracted for the third month following 29 consecutive months of expansion, as spending is shifting away from goods toward services. Since peaking at 63.8 in March 2021, the M-PMI has dropped to a 32-month low of 47.4, with new orders and production pushing the index lower. The *new orders* (to 42.5 from 45.1) measure was in negative territory for the fifth straight month, falling to its lowest reading since the height of the pandemic, while the *production* (48.0 from 48.6) gauge dropped further into negative territory, after falling below the breakeven point of 50.0 at the end of last year for the first time since May 2020. In the meantime, the *employment* (50.6 from 50.8) gauge hovers around 50.0, as factories hold on to their workers for now. The *supplier deliveries* measure was little changed at 45.6, after plummeting from 78.8 during May 2021 to 45.1 by December 2022—the lowest since March 2009. (A reading below 50.0

indicates faster deliveries to factories.) The *backlog* of orders subindex remains well below 50.0, climbing the past two months to 43.4 after plummeting from 70.6 during May 2021 to 40.0 in November—the lowest since May 2020—as weakening demand and improved raw materials supplies have reduced backlogs of unfinished work at factories. The combination of better supply and ebbing demand has resulted in a significant slowdown in price pressures. ISM's *prices-paid* measure rose a bit in 44.5 in January, after falling from 87.1 in March 2022 to a 32-month low of 39.4 at the end of last year; it was at 92.1 in mid-2021—which was the fastest since the summer of 1979.

Global Economic Indicators

Global Manufacturing M-PMIs (*link*): "Contraction in global manufacturing output shows signs of easing at the start of 2023" was the headline of the January release. The JP Morgan Global M-PMI increased for the first time since last May, edging up to 49.1 in January—as rates of decline in output and new orders slow. That's down from 52.3 last May to 48.6 by the end of 2022—which was the lowest reading since mid-2020. The report notes that only nine out of the 31 nations for which January data were available signaled expansions in output—with the pockets of growth largely confined to Asia—though Italy, the Netherlands, and Canada showed an increase in growth. Looking at largest industrial regions, China, US, Eurozone, and Japan saw rates of contraction slow, as did the UK, Brazil, and Turkey. Here's how January M-PMIs ranked by country/region from highest to lowest: India (55.4), Thailand (54.5), Philippines (53.5), Russia (52.6), Indonesia (51.3), Canada (51.0), France (50.5), Italy (50.4), Ireland (50.1), Turkey (50.1), Australia (50.0), Kazakhstan (50.0), Myanmar (49.6), Netherlands (49.6), Greece (49.2), China (49.2), WORLD (49.1), Japan (48.9), Mexico (48.9), EUROZONE (48.8), South Korea (48.5), Colombia (48.5), Austria (48.4), Spain (48.4), Poland (47.5), Brazil (47.5), Vietnam (47.4), Germany (47.3), UK (47.0), US (46.9), Malaysia (46.5), Czech Republic (44.6), and Taiwan (44.3).

Contact us by *email* or call 480-664-1333.

Ed Yardeni, President & Chief Investment Strategist, 516-972-7683
Debbie Johnson, Chief Economist, 480-664-1333
Joe Abbott, Chief Quantitative Strategist, 732-497-5306
Melissa Tagg, Director of Research Projects & Operations, 516-782-9967
Mali Quintana, Senior Economist, 480-664-1333
Jackie Doherty, Contributing Editor, 917-328-6848
Valerie de la Rue, Director of Institutional Sales, 516-277-2432

Mary Fanslau, Manager of Client Services, 480-664-1333
Sandy Cohan, Senior Editor, 570-228-9102