Yardeni Research

MORNING BRIEFING
January 28, 2021

Faster 5G Rollout & Faster-Charging Batteries

Check out the accompanying chart collection.

(1) 5G and EV: two races to watch. (2) T-Mobile leads the 5G rollout, leaving Verizon and AT&T playing catch-up. (3) T-Mobile has the broadest nationwide coverage, the best 4Q subscriber growth, and much better share price performance over the past year than its two rivals. (4) 5G opens the door to technological marvels galore. (5) A look at S&P 500 P/E inflation over the past year. (6) Foreign EV automakers may see greener pastures in the US after Biden's initiatives. (7) The winner of the EV race may be the manufacturer with the longest-running, fastest-charging battery. (8) Innovation is super-charging EV battery evolution.

Communications Services: The 5G Rollout Begins. After talking about the advent of 5G for years, carriers are finally, slowly starting to roll out the service. The three major telecom companies—AT&T, T-Mobile, and Verizon—each have 5G rollout plans with hopes that they can become the leading provider. So far, T-Mobile appears to be in the lead, as it has the most 5G coverage thanks to the spectrum it inherited from its merger with Sprint. The carrier has enjoyed faster subscriber growth than its competitors in recent quarters, and its shares are up 61.1% y/y through Tuesday's close, compared to Verizon's 6.2% decline and AT&T's 22.7% drop.

That said, it's very early days in the 5G rollout, and the company's position could quickly change. AT&T and Verizon reportedly paid big bucks in the recent wireless spectrum auctions to bolster their positions. Brokers estimate that Verizon paid $42 billion in the auction, AT&T bid $22 billion, and T-Mobile $10 billion, a January 20 *WSJ* article reported. Given the big bets being made, we thought it a good time to look at the telecom giants' earnings, which were reported this week:

(1) *T-Mobile winning the mobile subscriber race.* T-Mobile has been on quite a streak, adding more subscribers than its much larger competitors. In Q4, T-Mobile added 824,000 postpaid phone net subscribers, compared to Verizon's 279,000 postpaid phone additions and AT&T's 800,000. T-Mobile credits its leadership position in 5G, with its Ultra Capacity 5G covering 106 million people in 1,000 cities, including major markets New York City, Los Angeles, Chicago, and Houston. The company intends to have nationwide 5G coverage by the end of this year.

Verizon said its Ultra Wideband 5G is in 64 cities, and the company plans to add another 20 cities this year as it targets dense urban areas and then stadiums. AT&T's 5G Plus is in 36 cities.

Verizon's sub additions were less than half the 790,000 postpaid phone subscribers it added in Q4-2019. The miss was unexpected because analysts were hopeful Apple's 5G-enabled iPhone 12, which was released in October, would have boosted results by driving an upgrade cycle. Verizon's CEO Hans Vestberg noted that the transition to 5G was actually "going faster" than the transition to the 4G cycle and that the clients the firm was adding and retaining were using higher-end services, like the company's unlimited plan. The quarter's results were dampened by rising Covid-19 cases in Q4, which resulted in more cautious consumers and elevated store closures.

(2) *Peering into the 5G future.* The advent of 5G should mean the rollout of many new technologies we certainly haven't yet imagined. To make them possible, the tech gurus are saying that cloud computing will move from a cloud server far away to equipment on the edge of a neighborhood's network. Edge computing should continue to increase the speed of data transmission, but carriers will have to open their wallets to make it happen. Spending to enable edge computing—more officially called "multi-access edge computing," or "MEC"—is forecast to increase from $2.7 billion in 2020 to $8.3 billion in 2025, according to Juniper Research forecasts cited in a January 22 InfoWorld article.

But when the system is built out, techies are promising it will be worth the expense. In addition to autonomous driving, the brains at McKinsey expect 5G to enable a host of intelligent mobility services, including preventative maintenance, improved navigation, carpooling services, and personalized infotainment offerings. "Vehicle-to-infrastructure and vehicle-to-vehicle communications can prevent collisions, enable various levels of vehicle autonomy, and improve traffic flow," the firm's February 20, 2020 report claims.

Advanced networks could transform healthcare with the help of connected devices and sensors. McKinsey envisions doctors monitoring patients at home in real time and health data that flows throughout the medical system so care can be better coordinated. Doctors will make decisions aided by artificial intelligence, and the ability to "aggregate and analyze enormous data sets could yield new treatments."

In this new 5G world, smart factories will use artificial intelligence, analytics, and robotics to increase efficiency and productivity. Companies may use automated guided vehicles and computer-vision-enhanced bin picking and quality control. In addition to using 5G to improve their warehouse operations, retailers may also use 5G networks to eliminate checkout and add augmented reality services to provide customers with better product information. McKinsey estimates that 5G-related advancements in the four commercial areas it highlights could boost global GDP by as much as $2.0 trillion by 2030. Put more simply, if you build it, they will come.

(3) *A look at earnings.* AT&T and Verizon make up the S&P 500 Integrated Telecommunication Services stock price index, which is down 0.4% ytd (*Fig. 1*). The industry is one of the laggards within the S&P 500 Communication Services sector, which is up 3.1% ytd through Tuesday's close thanks to some of the growthier industries in that sector.

Here's the performance derby for the S&P 500 sectors through Tuesday's close: Energy (7.5%), Consumer Discretionary (5.4), Health Care (3.8), Communication Services (3.1), Information Technology (3.0), Real Estate (2.6), S&P 500 (2.5), Financials (1.2), Utilities (1.1), Materials (0.8), Industrials (-1.7), and Consumer Staples (-2.0) (*Fig. 2*). The S&P 500 Communication Services sector ytd performance through Tuesday is being bolstered by the S&P 500 Alternative Carriers (49.6), Broadcasting (32.1), and Advertising (6.0) industries (*Fig. 3* and *Fig. 4*).

The S&P 500 Integrated Telecom industry is suffering from a lack of earnings growth. Forward revenues per share have been on a downward trajectory since 2013, and operating earnings per share have been essentially flat for the past three years (*Fig. 5* and *Fig. 6*). This year, revenue is expected to rise 2.4%, more than the forecasted earnings gain of 1.6% (*Fig. 7* and *Fig. 8*). But the industry's forward P/E, at only 10.2, reflects the tough years the industry has faced (*Fig. 9*).

Strategy: Inflating Valuation Multiples. The 435% gain in GameStop shares this week through Wednesday's close has been amazing to watch, but only because we're not short the stock. Gamers have started playing the Wall Street game. They are the new "Occupy Wall Street" crowd. And they couldn't care less that analysts are expecting the company to lose $2.10 per share in 2020, followed by a 17-cent loss this year. Social-media-fueled momentum and humbling institutional short sellers appear to be the names of their game.

The S&P 500 isn't nearly as frothy as the select group of highly shorted stocks that spiked this week on short-covering rallies inflicted on the pros by the gamesters. But its forward P/E multiple has increased notably over the past year. The index's forward P/E has climbed 20.6% y/y to 22.7 as of the January 21 week—among the highest the readings of the multiple since March 2000.

The forward earnings multiples on all of the S&P 500 sectors—except for Consumer Staples and Utilities—have expanded over the past year. Here are the S&P 500 sectors' current forward P/Es and where they stood a year ago: Real Estate (53.5, 44.4), Consumer Discretionary (36.8, 22.5), Energy (27.8, 16.7), Information Technology (27.6, 22.8), Industrials (24.2, 17.4), Communication Services (23.3, 19.6), S&P 500 (22.7, 18.8), Materials (21.3, 18.0), Consumer Staples (20.1, 20.5), Utilities (18.8, 20.7), Health Care (16.9, 16.4), and Financials (14.3, 13.2) (*Table 1*).

Some of the multiple expansion has occurred in areas where earnings were hard hit by Covid-19—reflecting severely depressed business where the "Es" in the P/E ratio calculations dropped to next to nothing in some cases (e.g., oil and gas), not reflecting speculative excess. Many of the REIT and Energy industries fall into this bucket, as does the Movies & Entertainment industry. Here are the S&P 500 industries that have seen their forward P/Es expand the most over the past year: Health Care REITs (119.8, 57.5) Office REITs (67.6, 47.7), Industrial REITs (65.0, 63.2), Movies & Entertainment (64.4, 31.8), and Residential REITs (63.3, 54.4).

That said, there are industries that have enjoyed multiple expansion because investors are enthusiastic about their prospects. S&P 500 Internet & Direct Marketing Retail, home to Amazon, sports a 61.4 forward P/E, a 31.7% jump compared to a year ago, while the forward P/E on the S&P 500 Application Software industry has jumped to 48.2 from 39.6 a year ago. Several cyclical industries have also benefitted from investor optimism. Here are the current and year-ago forward P/Es for the following S&P 500 industries: Automobile Manufacturers (51.2, 6.2), Construction Materials (30.5, 23.4), Industrial Gasses (28.3, 25.4), Trucking (27.3, 22.2), Metal & Glass Containers (27.2, 24.0), Specialty Chemicals (25.6, 19.3), and Commodity Chemicals (16.1, 10.1).

Meanwhile, there are industries that have been left behind, with below-market P/Es, some of which are the same or lower today than they were a year ago. The S&P 500 Biotechnology industry surprisingly falls into this camp, with a current forward P/E of 11.8, almost flat with its

year-ago 11.6 level. The same is true for Pharmaceuticals (14.3 versus 14.8). And many financial industries languish at the bottom of the list, hurt by the low-interest-rate environment: Reinsurance (9.9, 11.6), Multi-Line Insurance (9.9, 10.7), Diversified Banks (12.3, 11.5), Property & Casualty Insurance (13.5, 14.2), Investment Banking & Brokerage (13.6, 11.6), and Asset Management & Custody Banks (13.9, 12.7).

Disruptive Technologies: Faster-Charging Batteries. It didn't take President Joe Biden long to show he intends to push the US toward greener energy sources. Earlier this week, he announced a plan to replace the government's gasoline-and diesel-powered vehicles with electric vehicles (EVs) assembled in the US. No time period was given for replacing the 645,000 cars and trucks in the government's fleet, 35% of which are used by the US Postal Service.

Nonetheless, the news should encourage more EV automakers to establish US manufacturing operations, joining the slim ranks of Tesla, General Motors, Nissan Motor, and soon Ford Motor.

Investors in the EV space continue to be ebullient. Last week, BYD—the Chinese car and battery company in which Warren Buffet has a stake—raised $3.9 billion from a stock sale. Even after the sale, BYD's Hong Kong-listed shares are up 465.8% y/y.

The company that can make the longest-running or fastest-charging battery may be poised to win the EV race. Here's a look at some of the technological advances that have made news in the battery space recently:

(1) *Faster charging.* We're always impressed by people who take a problem and turn it on its head in an effort to find the answer. That's what StoreDot has done with batteries. Instead of trying to make a battery that can last for 500 miles and takes an hour to charge, the company has developed a battery that lasts for only 300 miles on a charge but can be charged in five minutes.

A battery being charged fast generates a lot of heat. StoreDot has overcome this problem by placing holes between the battery cells and developing a charging station with fans that force air through the battery to keep it cool, a January 23 article in ARS Technica reported. That structure would have to be much larger than the typical battery to have the same amount of power. So StoreDot is working on increasing its batteries' density and experimenting with

different materials to make its electrodes. One such material is germanium, but using it is very expensive. The experimentation undoubtedly will continue.

(2) *A peek at Tesla's new battery structure.* In addition to looking at the materials inside the battery, Tesla is working on the actual structure of the battery. It's taking a lesson from the airlines, which build airplane wings as fuel tanks instead of building the fuel tanks inside the wings, explained a January 19 Electrek article. Instead of building a battery that's installed inside a car, Tesla is making the battery part of the car's frame.

"Using its expertise in giant casting parts, Tesla can connect a big single-piece rear and front underbody to this structural battery pack," the article explained. Doing so reduces the number of parts in the car and the mass of the battery pack, thereby improving efficiency and potentially the range of the vehicles. However, it also could complicate car crash repairs and raises the question of how the battery would be swapped out at the end of its life.

Chinese carmaker Nio has a business model based on the ability of a driver to swap out an old, uncharged battery for a new, fully charged battery in minutes instead of waiting around for the old battery to charge. The company launched its Battery as a Service subscription model, which allows consumers to buy the car without the battery—saving about $10,000—then sign up for the battery service, an August 21 *Car and Driver* article explained. The service has been available in China since 2014, but it's not expected to translate to the US market, where the industry is working on building out a nationwide charging system.

Of utmost interest to investors is whatever Apple is working on for its upcoming electric car, expected out in 2024. The company reportedly has "a new battery design that could radically reduce the cost of batteries and increase the vehicle's range," a December 21 Reuters article reported. The company is working with lithium iron phosphate, which makes the battery less likely to overheat than lithium-ion batteries. And it would use a "monocell" design inside the battery pack, which frees up space in which more battery material can be placed.

(3) *EU throws money at the problem.* The European Commission has approved "European Battery Innovation," a project with funding of up to 2.9 billion euros over the next few years provided by 12 EU member states. The public funding will be matched by nine billion euros in private investment. The project includes 42 companies, including Tesla and a number of German manufacturers that would work on 300 "planned collaborations" with more than 150 external research institutions across Europe.

Here are some of the research projects being funded, according to a January 26 article in Electrive: “ACI Systems is working on a water-neutral and competitive process to produce lithium from brine with minimal CO2. Alumina Systems is developing battery cells based on Na/NiCl2 technology and piloting their production. BMW … wants to develop the next generation Li-ion cells, including solid-state batteries, in the second IPCEI.

“The Cellforce Group’s project involves the development of future-proof high-performance battery cells of outstanding quality. ElringKlinger wants to develop and industrialise an innovative cell housing design. Liofit from Kamenz wants to apply the circular economy principle to Li-ion batteries for micro-electromobility (pedelecs, e-scooters).

“The automation specialist Manz wants to develop highly efficient machines and processes for the fully automated production of lithium batteries … Northvolt wants to support the development of a competitive European value chain for batteries. Here, the Swedish company is apparently looking into building another battery factory in Germany and the project with Volkswagen in Salzgitter.”

CALENDARS

US: Thurs: GDP 4.0%, GDP Price Deflator 2.4%, Headline & Core PCEDs 2.3%/1.5%, Leading Indicators 0.3%, Initial & Continuous Jobless Claims 875k/5.054m, New Home Sales 865k (+1.9%), Advance Goods Trade Balance, Wholesale Inventories, Kansas City Fed Manufacturing Index, EIA Natural Gas Storage. **Fri:** Personal Income & Consumption 0.1%/-0.1%, Core PCED 0.1%m/m/1.3%y/y, Consumer Sentiment Index 79.2, Employment Cost Index 0.5%, Pending Home Sales -0.1%, Chicago PMI, Baker-Hughes Rig Count, Daly. (DailyFX estimates)

Global: Thurs: Eurozone Economic Sentiment 89.5, Eurozone Consumer & Industrial Confidence -15.5/-7.2, Italy Business & Consumer Confidence 96.5/100.5, Germany CPI 0.4%m/m/0.7%y/y, Spain Unemployment Rate 16.6%, Japan Unemployment Rate 3.0%, Japan Industrial Production -1.5%m/m/-0.6%y/y, BOJ Summary of Opinions, World Economic Forum Annual Meeting, Enria, Schnabel. **Fri:** Germany GDP Flash 0.0%q/q/-4.0%y/y, Germany Unemployment Change & Unemployment Rate 6k/6.1%, Spain GDP Flash -1.5%q/q/-10.8%y/y, Canada GDP 0.4% m/m, Japan Consumer Confidence, Japan Housing Starts -3.8%. (DailyFX estimates)

STRATEGY INDICATORS

Stock Market Sentiment Indicators (*link*): The Bull/Bear Ratio (BBR) this week climbed to 3.71 after falling from 3.81 to 3.60 last week—only the second increase since the week of December 22—though it's been above 3.00 since the week of November 11. Bullish sentiment rose to 61.2% this week after falling from 63.7% to 60.4% last week—its ninth consecutive reading above 60.0%. It was at 64.7% at the end of November—which was the highest percentage since January 2018 (66.7%). Meanwhile, bearish sentiment was slightly lower this week, slipping from 16.8% to 16.5%; it's only 0.3ppt above the 2.5-year low of 16.2% posted during the September 8 week. The correction count this week slipped to 22.3% after jumping to a 10-week high of 22.8% last week, following a decline to 19.6% two weeks ago; in late November, the percentage was just 18.2%—the lowest since December 2006. The AAII Ratio fell last week for the fourth week, from 66.5% to 55.2% over the period. Bearish sentiment rose from 22.0% to 34.5% over the period, while bullish sentiment fell from 46.1% to 42.6% over the past three weeks.

S&P 500 Earnings, Revenues, Valuation & Margins (*link*): The rapid pace of Covid-19 estimate cuts has turned into a V-shaped recovery as analysts continue to play catch-up from their lowball estimates prior to the better-than-expected Q2 and Q3 earnings seasons. Consensus S&P 500 forecasts had been falling at rates paralleling the declines during the 2008-09 financial crisis. Forward revenues is now at its highest level since early March and is just 1.9% below its record high in mid-February. Forward earnings is at its highest level since mid-March and is now 4.3% below its record high in early March. Forward revenues growth edged up 0.1ppt w/w to 8.1%, its highest reading since April 2011. That's up from 0.2% in April, which was the lowest reading since June 2009. Forward earnings growth steady w/w at 22.3%, down 0.3ppts from its highest level since July 2010, but has risen 27.9ppts from its record low of -5.6% at the end of April. Analysts expect revenues to decline 2.8% y/y in 2020 and rise 8.3% in 2021 compared to the 4.4% reported in 2019. Analysts expect an earnings decline of 14.2% y/y in 2020 and a 23.2% gain in 2021 compared to a 1.5% rise in 2019. The forward profit margin rose 0.1pts w/w to 11.7%; that's the highest reading since mid-March and up 1.4ppts from 10.3% during April, which was the lowest level since August 2013. It's still down 0.7ppt from a record high of 12.4% in September 2018. Analysts expect the profit margin to fall 1.3ppt y/y in 2020 to 10.2%—from 11.5% in 2019—and to improve 1.4ppt y/y to 11.5% in 2021. Valuations rose for a second straight week. The S&P 500's weekly forward P/E gained 0.1pt w/w to a 20-week high of 22.7, which compares to a six-month low of 20.6 at the end of

October. That compares to 23.1 in early September, which was the highest level since July 2000 and up from a 77-month low of 14.0 in mid-March. The S&P 500 price-to-sales ratio ticked up 0.02pt w/w to a new record high of 2.65. That compares to its prior record high of 2.53 at the beginning of September and is up from the 49-month low of 1.65 in mid-March.

S&P 500 Sectors Earnings, Revenues, Valuation & Margins (*link*): Last week saw consensus forward revenues rise w/w for eight of the 11 S&P 500 sectors and forward earnings rise for all but Industrials. Energy, Financials, and Materials had both measures rise markedly last week. Due to the sharp decrease in forward earnings last year, forward P/E ratios for nearly all sectors now are back above their recent record or cyclical highs prior to the bear market. During 2019, just two sectors' margins improved y/y: Financials and Utilities. Tech and Utilities are the only sectors expected to have an improved profit margin in 2020, whereas back in early March eight sectors were expected to see margins improve y/y. All but Real Estate are expected to improve during 2021. The forward profit margin rose to record highs during 2018 for 8/11 sectors, all but Energy, Health Care, and Real Estate. Since 2018, it has moved lower for nearly all the sectors. The forward profit margin rose notably for Energy, Financials, and Real Estate in the latest week. Real Estate has been improving in recent weeks from its lowest level since January 2012 and Energy from its record low. Here's how the sectors rank based on their current forward profit margin forecasts versus their highs during 2018: Information Technology (22.5%, down from 23.0%), Financials (16.7, down from 19.2), Utilities (14.4, a new record high), Communication Services (14.1, down from 15.4), Real Estate (13.0, down from 17.0), S&P 500 (11.7, down from 12.4), Health Care (10.8, down from 11.2), Materials (10.9, down from 11.6), Industrials (8.7, down from its record high of 10.5% in mid-December), Consumer Staples (7.6, down from 7.7), Consumer Discretionary (6.8, down from 8.3), and Energy (3.8, down from 8.0).

S&P 500 Sectors Forward Revenues and Earnings Recovery from Covid-19 Trough (*link*): The S&P 500's forward revenues and earnings, as well as its implied forward profit margin, bottomed at cyclical lows on May 28 after 14 weeks of Covid-19-related declines. Since then, S&P 500 forward revenues has risen 6.7%, forward earnings has gained 21.5%, and the forward profit margin has risen 1.5pt to 11.7%. Among the 11 sectors, all but Industrials and Real Estate posted new post-Covid-19 highs during the latest week in either their forward revenues, earnings, or profit margin. The major laggards from their pre-Covid-19 highs: Energy, Financials, Industrials, and Real Estate. Among those four sectors, all but Real Estate appear to be on an upswing now. Here's how the 11 sectors rank by their changes in forward revenues and forward earnings since May 28: Communication Services (forward

revenues up 10.4%, forward earnings up 16.3%), Information Technology (10.2, 14.2), Materials (10.1, 36.4), Industrials (8.9, 28.9), Financials (8.8, 34.7), S&P 500 (6.6, 21.5), Health Care (6.6, 15.1), Consumer Staples (4.1, 9.9), Energy (4.3, 591.2), Real Estate (0.5, -8.3), Utilities (-1.1, 2.6), and Consumer Discretionary (-0.2, 44.7). Tesla's addition to the S&P 500 on 12/21 caused revenue and earnings forecasts to fall for the index and the Consumer Discretionary sector. Before then, S&P 500 revenues were up 7.1% and earnings 19.6%. The similar readings for Consumer Discretionary then were 11.2% and 39.7%, which would have ranked the sector first in the revenues derby instead of last.

S&P 500 Q4 Earnings Season Monitor (*link*): With nearly 23% of S&P 500 companies finished reporting revenues and earnings for Q4-2020, revenues are beating the consensus forecast by a well-above-trend 2.5%, and earnings have beaten estimates by 17.9%. The large surprises result from a lack of financial guidance from the companies that analysts follow during an economic rebound. At the same point during the Q3 season, revenues were 3.0% above forecast and earnings beat by 17.5%. For the 114 companies that have reported through mid-day Wednesday, aggregate y/y revenue and earnings growth and the percentage of companies reporting a positive revenue and earnings surprise have improved from their Q3 measures. The small sample of Q4 reporters so far has a y/y revenue gain of 3.7% and an earnings drop of 0.4%. Those results mark a big recovery from Q3-2020, which was the worst quarter since Q1-2009 during the financial crisis. A whopping 86% of the Q4 reporters so far has reported a positive earnings surprise, and 79% has beaten revenues forecasts. More companies have reported positive y/y earnings growth in Q3 (61%) than positive y/y revenue growth (53%). These figures will change markedly as more Q4-2020 results are reported in the coming weeks, and we expect the y/y revenue and earnings growth results to turn negative.

US ECONOMIC INDICATORS

Durable Goods Orders & Shipments (*link*): Both core capital goods orders and shipments in December moved further above their pre-pandemic levels to new record highs, though momentum has slowed, while total durable goods orders was within 0.4% of its pre-Covid reading. Nondefense capital goods orders ex aircraft (a proxy for future business investment) advanced for the eighth month, by 0.6% in December and 17.1% over the period, while core capital goods shipments (used in calculating GDP) increased 0.5% and 14.9% over the comparable periods. Orders for total durable goods also climbed for the eighth month, advancing 0.2% in December and 46.5% over the eight months through December. Motor vehicle & parts orders, a big contributor to the April to July rush in orders, increased 4.2%

during the two months through December, after declining two of the prior three months by 5.4%; it's up a whopping 186.3% since April's bottom and is 6.3% above its pre-pandemic level. Excluding transportation, orders climbed 0.7% in December and 18.0% the past eight months to a new cyclical high—and within 0.2% of a new record high—with computer and related products the only notable decline.

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