MORNING BRIEFING
January 9, 2020

The Vegas Show

See the collection of the individual charts linked below.

(1) 2030 is only 10 years away. (2) A future full of futuristic gadgets. (3) Elon Musk on our roofs. (4) Elon Musk's new battery. (5) Microbes as household pets. (6) A Crispr future. (7) Smart toilets. (8) 3-D plus one. (9) Musk in our brains. (10) Flying cars. (11) We will all be Jetsons. (12) What's cheap, what's not cheap in the S&P 500. (13) Paying up for safety.

Disruptive Technologies: The Latest Won't Stay in Vegas. There's something fitting about kicking off the new year with the Consumer Electronics Show in Las Vegas. It's filled with optimism and tech gadgets developed by folks dreaming up objects we never knew we wanted. Anyone interested in a Qoobo? It's a "therapy" pillow with a tail that moves when the pillow is petted.

Technology undoubtedly will continue to evolve in ways expected and unexpected over the next decade. Jackie will launch the new year by describing some of the cutting-edge technologies scientists are working on that may change all of our lives by the time 2030 rolls around. Some of the highlights: Cheap solar panels on every roof and an electric vehicle in every garage, microbes that turn our waste into electricity, gene editing to cure all of humans' worst ailments, organs grown in laboratories, 4-D manufacturing, telepathy, smart contact lenses, and a solution to traffic. We'll be sure to check back in after the ball drops in 10 years to see if she hit the mark.

For now, consider all this:

(1) *Harnessing the sun.* Starting this year, California is requiring all new homes to have solar panels, which is expected to make the price of a new home jump by about $10,000. While this is a good start to increasing solar power, the country's new home sales (roughly 1 million a year) are a very small part of the US housing inventory of 95 million homes.

Our bet: By 2030, solar panels will become so inexpensive that every homeowner replacing an old roof will go green because the economics will work. The cost of panels and batteries will continue to drop sharply, driving this trend. Along the same lines, electric cars will become the norm as scientists figure out how to make solar panels that can quickly "fill up" the car's battery.

Fortunately, there has been a renaissance in battery technology, which we've been tracking. Most recently, a 12/26/19 Electrek article reported that Tesla filed a patent for a new battery technology, following CEO Elon Musk's boast that the firm will offer a car battery that lasts for a million miles! Currently, a battery will last between 300,000 and 500,000 miles.

(2) *Give microbes a chance.* If you live in an area without a lot of sun, microbes may be the answer. Scientists are working on how to harness the tiny organisms to generate fuel and fertilizer from our waste.

"[E]ach home will have a 'digester' that provides an ideal home for microbes, which feed on our liquid waste. As they feed on our waste fluids, they turn them into clean water, low power 12V electricity supply and a range of organic compounds that can be used for a range of things like fertilizer," predicted Professor Rachael Armstrong, professor of experimental architecture and coordinator of the Living Architecture program at New Castle University, in a 1/6 article on Sky News.

She continued: "Cleaned water will be recycled back into our bathrooms and kitchens, reducing our overall water consumption. Organic matter will be used to feed our pot plants, window boxes and gardens, so we won't need to buy fertilizers to make them greener." And the electricity generated will be enough to charge mobile phones, provide light, and energize a robot.

(3) *A healthier future.* While advances in healthcare have been amazing, we believe the changes in the next decade are going to be even more dramatic. The ability to harness sensors, the Internet, artificial intelligence, and quantum computing will keep us all healthier and living longer.

We expect to see the continued development of Crispr gene-editing technology. Crispr Therapeutics used gene editing to treat two patients with blood disorders. It removed cells from

their bodies to edit their DNA, then returned the cells. It's also planning to launch trials to treat solid tumors and to create an artificial pancreas.

But that's just the start. Companies soon will begin running trials where the virus that does the gene editing is injected directly into humans. Intellia Therapeutics is using Crispr inside patients to attempt to cure amyloidosis, a life-threatening liver condition. And Editas Medicine is injecting a Crispr virus into patients' eyes to try to cure an inherited eye disorder, a 1/6 *FT* article reported. This appears to be stage one of a very long journey.

In the future, we may also be able to grow transplantable organs using our own skin cells to replace our aging or faulty organs. "The basic structure will be 3D-printed in dissolvable material. Skin cells from a recipient will be converted to T-cells, which are then programmed to grow around the scaffold and become a kidney, liver, or other organ. No anti-rejection drugs will be needed because it IS the donor's organ," explained a 10/30/19 article in *DesignNews*.

Lastly, inexpensive sensors will be able to monitor various aspects of our health every day so we can stay healthier and catch disease sooner, according to a November presentation at the a16z Summit by Frank Chen, an Andreessen Horowitz partner. Chen imagines a "smart" toilet that uses sensors to test 10 properties of urine, including glucose levels. There will also be sensors that monitor both our speech and our selfies to detect depression, Alzheimer's, and skin cancer, as well as sensors in our clothes that track our heart rate and temperature. Then, based upon collected data, food can be personalized to deliver the nutrients our bodies need.

(4) *Everything pops up.* As machines and materials have gotten less expensive, 3-D printing has become commonplace, particularly in the manufacture of industrial parts. Up next: 4-D printing. Objects will still be 3-D-printed; but in the future, they will be delivered flat in an envelope. Once a 4-D-printed item is exposed to a stimulus like heat, light, or water, it will pop into shape.

"4-D printing is 3-D printing that can transform shapes after [they have] been printed. Imagine a 3-D-printed flower that blooms when it detects light or to use another show example, 3-D-printed shoes that become cowboy boots when they hear 'Old Town Road.' MIT assistant professor Skyler Tibbits is credited for having pioneered the field and is currently working with software company Autodesk to make 4-D printing more realistic," a 6/18/19 CNBC article reported. The technology, which is still in early development, could save a lot of bubble wrap

now that so much of what consumers use is ordered online and shipped.

(5) *Demystifying the brain.* Lots of big brains are working to understand just how brains work. A group of Japanese scientists is developing machines that can read your mind and turn your thoughts into text messages, a 1/1 article on Listverse reported. Right now, they can decode brain activity to create rough images from people's thoughts. And scientists at Carnegie Mellon University have created a machine that looks at brain signals to read your mind with 87% accuracy.

Elon Musk's Neuralink is developing chips that will be implanted in brains and be able to fire at the correct neurons to heal brain-related diseases, like autism, schizophrenia, and Alzheimer's.

(6) *Super smart contact lenses.* Forget smart glasses. Andreessen Horowitz's Chen sees smart contacts becoming commonplace by 2030. Put them in, and they will be able to tell you the names of people entering your field of vision and when you last saw them. Scientists are already hard at work on this vision. Professor Jean-Louis de Bougrenet de la Tocnaye is leading a team at IMT Atlantique, a technology university in France, that developed a contact with a battery inside. In the future, he anticipates the battery will be transparent, a 11/20/19 article in *New Atlas* reported. Combine that battery with the mini display being made by Mojo Vision, and all sorts of information can appear in front of your eyes. Mojo's display has 200 million pixels per square inch; it could augment reality without those clunky looking headsets.

(7) *More dreams for 2030.* What else could the next 10 years bring? Perhaps regular flights to the moon or a solution to traffic on Earth, whether it be automated cars, flying cars, flying humans in exoskeletons, or Musk's hyperloops. More robots at home and at work seem to be in the cards as well. One in 50 households in affluent markets will own a domestic robot by 2025, according to a 10/7/19 ZDnet article. We certainly hope it knows how to do laundry and make dinner. Now that would be cool.

Strategy: Taking Stock of P/Es. In an act of amazing resilience, the S&P 500 remains near record highs even in the wake of skirmishes between the US and Iran. The index's 28.9% climb last year has left its forward P/E at a lofty 18.2, almost four points higher than it was last year at this time (*Fig. 1*). Let's take a look at the S&P 500 sectors' earnings growth and P/Es to see what looks cheap and expensive as 2020 begins:

(1) *Where we stand.* Here's the performance derby for the S&P 500 sectors' current and year-ago forward P/E: Real Estate (43.4, 36.1), Consumer Discretionary (22.1, 18.2), Information Technology (21.5, 15.2), Consumer Staples (20.1, 16.6), Utilities (19.9, 15.8), Communication Services (18.6, 15.7), S&P 500 (18.3, 14.5), Materials (18.2, 13.5), Energy (17.1, 13.3), Industrials (16.8, 13.4), Health Care (16.0, 14.5), and Financials (13.3, 10.4) (*Table 1*).

(2) *Potential for improvement.* It's notable that some of the sectors with the lowest P/Es are expected to have some of the fastest earnings growth this year. If analysts are correct, those sectors could fare well. For example, the S&P 500 Industrials sector has a 16.8 forward P/E but analysts are forecasting 13.9% earnings growth, making it the second-fastest growing sector in the S&P 500 (*Fig. 2* and *Fig. 3*). Likewise, the Energy sector, with a below-market forward P/E of 17.1, is expected to grow earnings by 22.9% in 2020, rebounding from a 27.7% decline in earnings last year (*Fig. 4* and *Fig. 5*).

(3) *Low for a reason.* A number of sectors have low forward P/Es, but deservedly so, apparently, given their lower-than-average expected earnings growth this year. The Financial sector's forward P/E of 13.3 would look like a bargain were it not for its projected 2020 earnings growth of only 5.4% (*Fig. 6* and *Fig. 7*). Similarly, the Health Care sector's 16.0 forward P/E is still almost twice its forecast earnings growth of 8.6% in 2020 (*Fig. 8* and *Fig. 9*).

(4) *High P/E but growing fast.* A tougher call is what to do with sectors that are growing quickly and have a lot of good news reflected in their earnings multiple. The Consumer Discretionary sector's forward P/E of 22.1 is almost twice its 12.5% 2020 earnings growth rate (*Fig. 10* and *Fig. 11*). The same applies to Communications Services, which has a high forward P/E of 18.6 but also expected 2020 earnings growth of 10.8% (*Fig. 12* and *Fig. 13*). The Materials sector is a surprise member of this category, with a 18.2 forward P/E and above-market earnings growth of 13.0% (*Fig. 14* and *Fig. 15*).

(5) *Watch out below.* The real head scratchers are Information Technology, Consumer Staples, and Utilities industries. They each have very high P/Es and very low expected earnings growth. The Tech sector, with its 21.5 forward P/E, is the market's third most expensive sector. Yet it's only forecast to grow earnings 7.7%, far below the S&P 500's growth rate of 8.9% (*Fig. 16* and *Fig. 17*). Consumer Staples' 20.1 forward P/E is multiples of the expected 6.4% 2020 earnings growth (*Fig. 18* and *Fig. 19*). Likewise, Utilities' 19.9 forward P/E looks lofty relative to a 4.6% earnings growth estimate (*Fig. 20* and *Fig. 21*). That's an awfully

high price to pay for safety.

CALENDARS

US: Thurs: Jobless Claims 221k, Williams, Clarida. **Fri:** Payroll Employment Total, Private, and Manufacturing 162k/152k/5k, Unemployment Rate 3.5%, Average Hourly Earnings 0.3%m/m/3.1%y/y, Average Weekly Hours 34.4hrs, Wholesale Inventories 0.2%, Baker-Hughes Rig Count. (DailyFX estimates)

Global: Thurs: Eurozone Unemployment Rate 7.5%, Germany Industrial Production 0.8%m/m/-3.6%y/y, Germany Trade Balance €21.0b, Japan Household Spending -2.0% y/y, China New Yuan Loans ¥1250b, China Aggregate Financing, Mexico CPI 2.76% y/y, Carney. **Fri:** Japan Leading & Coincident Indicators 90.5/95.2, Canada Employment Change & Unemployment Rate 25k/5.8%, Mexico Industrial Production -1.6% y/y, Tenreyro. (DailyFX estimates)

STRATEGY INDICATORS

Stock Market Sentiment Indicators (*link*): The Bull/Bear Ratio (BBR) slipped again this week, to 3.10, from 3.34 during the 12/17 week—its10th straight reading above 3.00. (Note: No data were reported during the week ending 12/24.) Once again, there were wide swings in bullish sentiment and the correction count. Bullish sentiment slipped to 55.1% this week after jumping 5.6ppts (to 58.9% from 53.3%) the prior two reporting weeks, while the correction count rose to 27.1% after falling 6.2ppts (23.3 from 29.5) the prior two weeks. Bearish sentiment was unchanged at 17.8% this week, continuing to fluctuate in a narrow band. The AAII Ratio fell for the second week last week, from 68.3% to 63.0%, with bullish sentiment sliding from 44.1% to 37.2% over the period and bearish sentiment rising from 20.5% to 21.9%.

S&P 500 Earnings, Revenues, Valuation & Margins (*link*): Consensus S&P 500 forward revenues and earnings both rose last week, and are now at record highs for the first time since early October. Analysts expect forward revenues growth of 4.9% and forward earnings growth of 9.5%, with the earnings measure up 0.2ppt w/w. Forward revenues growth is at a 40-month low and 1.4ppt from a seven-year high of 6.3% in February 2018. Forward earnings growth is down 7.4ppts from a six-year high of 16.9% in February 2018 but is still comfortably above its 34-month low of 5.9% in February 2019. Prior to the passage of the Tax Cuts and Jobs Act (TCJA), forward revenues growth was 5.5% and forward earnings growth was 11.1%. Turning

to the annual growth expectations, analysts expect revenues growth to slow from 8.5% in 2018 to 4.1% in 2019 and 4.9% in 2020. They're calling for earnings growth to slow sharply from 24.0% in 2018 to 1.1% in 2019 before improving to 8.9% in 2020. The forward profit margin improved 0.1ppt w/w to 12.0% from a 22-month low of 11.9% and is down only 0.4ppt from a record high of 12.4% in September 2018. That compares to 11.1% prior to the passage of the TCJA in December 2017 and a 24-month low of 10.4% in March 2016. Analysts are expecting the profit margin to drop 0.3ppt y/y from 11.8% in 2018 to 11.5% in 2019 before improving to 11.9% in 2020. The S&P 500's forward P/E fell 0.1pt to 18.3 from its 23-month high of 18.4 a week earlier. That's up from 14.3 during December 2018, which was the lowest reading since October 2013 and down 23% then from the 16-year high of 18.6 at the market's valuation peak in January 2018. The S&P 500 price-to-sales ratio dropped 0.01pt w/w to 2.19 from its record high of 2.20. That's up from 1.75 during December 2018, when it was the lowest since November 2016, and down 19% from its then-record high of 2.16 in January 2018.

S&P 500 Sectors Earnings, Revenues, Valuation & Margins (*link*): Consensus forward revenues and earnings rose w/w for all 11 S&P 500 sectors last week. Forward revenues and earnings are at or around record highs for 4/11 sectors: Consumer Discretionary, Health Care, Industrials, and Tech. Forward P/S and P/E ratios remain near record or cyclical highs for Communication Services, Consumer Discretionary, Health Care, Information Technology, Real Estate, and Utilities. Financials continues to rebound from cyclical lows at the start of the last decade, while the remaining sectors are above their multi-year lows during December 2018. Due to the TCJA, the profit margin for 2018 was higher y/y for all sectors but Real Estate. However, just two sectors are expected to have higher margins y/y in 2019: Financials and Utilities. The forward profit margin rose to record highs during 2018 for 8/11 sectors, all but Energy, Health Care, and Real Estate. Since then, it has moved lower for nearly all the sectors. Utilities is the only sector with its forward profit margin at a record high. Here's how the sectors rank based on their current forward profit margin forecasts versus their highs during 2018: Information Technology (21.7%, down from 23.0%), Financials (18.1, down from 19.2), Real Estate (15.7, down from 17.0), Communication Services (14.8, down from 15.4), Utilities (13.2, record high), S&P 500 (12.0, down from 12.4), Health Care (10.5, down from 11.2), Industrials (10.4, down from its record high of 10.5% in mid-December), Materials (10.3, down from 11.6), Consumer Discretionary (7.4, down from 8.3), Consumer Staples (7.4, down from 7.7), and Energy (6.4, down from 8.0).

US ECONOMIC INDICATORS

ADP Employment (*link*): Private industries added to payrolls in December at the fastest pace in eight months, and ADP reported sizeable upward revisions to prior months as well. Private companies hired 202,000 during the final month of 2019, after averaging gains of only 122,000 per month the prior seven months. Revisions to November (to 124,000 from 67,000) and October (151,000 from 121,000) payrolls showed a net gain of 87,000. Job creation in December spanned companies of all sizes, with medium-sized companies keeping the top spot. Service-providing industries posted their largest gain since April, adding 173,000 to payrolls, with trade, transportation & utilities (78,000), professional & business services (61,000), and health care & social assistance (46,000) posting impressive gains. Meanwhile, leisure & hospitality (-21,000) cut jobs for the first time since September 2017, while information services (-14,000) reduced payrolls for six of the 12 months of 2019. Goods-producing companies finished last year on an up note, adding 29,000 jobs in December, following a 2,000 uptick in November—the first back-to-back gain since April. Construction (37,000) companies accounted for December's increase, adding 66,000 jobs during the final six months of 2019. Manufacturing payrolls continued their up-and-down pattern, falling 7,000 in December after a 5,000 gain and a 3,000 loss the prior two months. Natural resources & mining (-1,000) shrank payrolls the final nine months of 2019 by a total of 31,000. Medium-sized (88,000) companies once again added the most jobs—recording its best pace since April, while small (69,000) companies moved up from the bottom spot, adding the most jobs since the start of 2019—more than double the average monthly gain the first 11 months of the year. In the meantime, large (45,000) companies moved down to the bottom spot, with December's increase falling short of its average monthly gain of 56,300 from January through November.

GLOBAL ECONOMIC INDICATORS

Eurozone Economic Sentiment Indicators (*link*): The Economic Sentiment Index (ESI) for the Eurozone (+0.3 point to 101.5) edged slightly higher during the final month of 2019, while the EU's was unchanged at 100.0. Both bottomed in October, at the lowest reading since January 2015 for the former and October 2013 for the latter. Among the Eurozone's largest economies, ESIs in Italy (+1.7 points to 101.6) and Spain (+1.3 to 103.2) increased notably during the month, while Germany's (+0.4 to 100.0) inched higher. Meanwhile, ESIs for France (-0.2 to 103.0) and the Netherlands (-0.4 to 100.4) slipped a bit. At the sector level, construction (+2.2 points to 5.0) and services (+2.2 to 11.4) posted the biggest improvements, followed by retail trade (+1.0 to 0.8), while industry (-0.2 to -9.3) and consumer (-0.9 to -8.1)

confidence deteriorated slightly last month.

Germany Manufacturing Orders (*link*): Orders remained volatile around recent lows in November, sinking to its lowest level since September 2016. Billings dropped 1.3% in November, as foreign orders contracted 3.1%, with orders from both inside (-3.3%) and outside (-2.8) the Eurozone declining during the month; domestic orders expanded 1.6%. Compared to a year ago, orders fell 6.5% y/y in November, with an 11.4% plunge in foreign orders from outside the Eurozone dragging overall foreign orders down 5.0% y/y; orders from within the Eurozone climbed 6.0% over the period. Meanwhile, domestic orders tumbled 8.5% y/y—the weakest yearly growth since May 2012. As for orders among the major industrial groupings, there were only a handful of plus signs on a y/y basis. Foreign orders from outside the Eurozone for both consumer durable (18.5% y/y) and consumer nondurable (14.9) goods posted the biggest gains, with foreign orders for capital goods (12.4) from within the Eurozone a close third; domestic orders for consumer durable goods (2.7) were also in the black. Germany's Economy Ministry, sounding hopeful, noted that brightened business expectations in manufacturing have improved the outlook for industrial activity a bit.

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