Life on the Edge

Technology I: Edge Computing. Data processing may be about to exit the clouds and move onto the “edge.” In edge computing, data processing occurs on or near a device that’s collecting data instead of sending the data up to the cloud for processing and then returning it to the device.

The dramatic change is being prompted by the sharp drop in the price of sensors, which is allowing them to be placed on more and more objects that will collect data and transmit that data over the Internet. Gartner Research estimates that the number of devices connected to the Internet will hit 20.4 billion by 2020, up from 8.4 billion last year.

But not all of the data collected by sensors needs to be processed or stored in the cloud or in a company data center. In fact, the data created may be so voluminous that not all of it can be processed in the cloud. So it’s widely expected that in the future much of that data will be processed closer to the sensors that created it, in what’s referred to as “edge computing.”

Edge computing may occur in a device or a micro data center that has computing power, storage, and is connected to the Internet. It may occur on the object that has the sensor, like an autonomous car, or it may be sent nearby to a processor located on a cell phone tower.

The edge computing market is expected to surge from $1.5 billion last year to $6.7 billion in 2022, a compound annual growth rate of 35.4%, according to an October report by research firm MarketsandMarkets. Likewise, Gartner predicts that by 2021, 40% of enterprises will have an edge computing strategy, up from 1% last year.

“As you go from a couple of billion connected devices to one hundred billion or a trillion, you are going to generate incredible quantities of data,” said Michael Dell, CEO of Dell Technologies, during The Channel Company’s Best of Breed conference in October, CRN reported. “We are seeing a boom in edge computing that is driven first by embedded intelligence. When we look at the companies that make things, they are putting in sensors that is going to require all kinds of computing, [artificial intelligence], machine learning close to those edge devices.”

To that end, Dell set up an IoT (Internet of Things) Solutions division last fall that will use hardware and software from across Dell to build products for the IoT edge. Dell is far from alone in pouncing on this new market. Companies displaced by the cloud and the cloud providers themselves are all offering up

The next Morning Briefing will be sent on Tuesday, February 20.

See the collection of the individual charts linked below.

(1) Will the cloud lose to the edge? (2) More devices connected to the Internet. (3) Every millisecond counts. (4) Disrupting the disruptors. (5) Internet of Things requires lots of semiconductors. (6) Powell won’t take the punch bowl away, but he won’t be adding any more punch. (7) The value of the trade-weighted dollar is mostly determined by relative growth of US to the rest of the world. (8) ECB seeing expansion rather than recovery in Eurozone. (9) Chinese currency has been strong. (10) The dollar has its ups and downs.
products and services for this developing market. I asked Jackie to get edgy and have a look at the new computing paradigm that has everyone “on edge”:

(1) **It’s speedier.** One of the prime reasons to use edge computing is that it’s faster to send information from the sensor to the edge and back to the object than it is to send information from the sensor to the cloud or a company data center and back to the object. The difference between the two setups may only be a matter of milliseconds, but milliseconds count when an autonomous car is driving or in other situations that require real-time decision making.

“The edge can be a hospital bed. The edge can be a jet engine. It can also be a factory floor. Real-time decisions are going to need to be made at the edge. You can’t tolerate the latency that it takes for the data to go back to a data center and then come back to a factory floor or a jet engine. You need those decisions being made in real time,” said HPE CEO Meg Whitman at the Best of Breed Conference, according to the 11/30 CRN article.

It typically takes 150 to 200 milliseconds for data to travel to a cloud provider and back. Placing computers or servers closer to the devices could shrink that time to two to five milliseconds, a fantastic 1/2 *WSJ* article explained.

(2) **It reduces traffic.** Edge computing can also sift through information created by sensors to determine what information should be sent to the cloud and what information can be discarded or held for an end-of-day report.

For example, an oil rig in the ocean may have thousands of sensors that generate data on how that pump is working 24/7. If the systems are working properly, all of that data are not needed instantaneously. It could go to the edge computer, which could discard all normal readings or package the normal readings in a report sent to the cloud or company data center once a day, explained a 9/21 article in Network World.

In that example, edge computing might occur in equipment on the rig. However, if the sensor was on equipment on land, the information could be sent to edge computing equipment that’s expected to be set up near wireless towers.

(3) **Solves connectivity problems.** If a device has poor Internet connectivity, it may not be efficient for the device to be constantly connected to a cloud or data center, the Network World article explained. So the data could be processed, held on the edge, and sent to the cloud just a few times a day.

(4) **Questions on safety.** Processing data on the edge could be considered safer because the data aren’t traveling as far nor does it need to depend on the security of the cloud provider. However, edge devices could be more vulnerable depending upon where they’re located.

(5) **Who’s diving in?** The list of companies jumping into edge computing ranges from small providers to household names. Some mentioned in the press include Scale Computing, APC by Schneider Electric, AT&T, Cisco systems, Dell Technologies, Eaton, Hewlett-Packard Enterprise, HP, Intel, and Vertiv.

The cloud computing giants—Amazon and Microsoft—are offering edge computing services as well, marketing them as an extension of their existing cloud services. Microsoft has Azure IoT edge and Amazon has Greengrass.

Peter Levine, a general partner of venture capital firm Andreessen Horowitz, warned in a 12/2016 presentation titled “The End of Cloud Computing” that the explosion in data from sensors will “kill” the
cloud, though not completely: He continues to see learning and data storage occurring in the cloud while data processing moves to the edge.

“There’s a big disruption on the horizon,” Levine says. “It’s going to impact networking. It’ll impact storage, compute, programming languages, security, and of course management. So, for all of you, I’d encourage you to get ready for one of the biggest transformations to occur on the computing landscape. It’s happening right underneath our eyes.” That’s certainly something to put you on edge.

**Technology II: IoT Needs Lots of Chips.** If the number of sensors grows and the amount of data produced skyrockets and demand for computers to process that data increases accordingly, then surely the need for semiconductors will continue to grow as well.

The semiconductor industry is already enjoying record levels of demand. Global sales in December hit a record $38 billion, up 0.8% from November and up 22.5% y/y, according to the Semiconductor Industry Association (SIA). For fiscal 2017, global sales totaled $412.2 billion, an industry record and a 21.6% y/y increase (Fig. 1).

“As semiconductors have become more heavily embedded in an ever-increasing number of products—from cars to coffee makers—and nascent technologies like artificial intelligence, virtual reality, and the Internet of Things have emerged, global demand for semiconductors has increased, leading to landmark sales in 2017 and a bright outlook for the long term.” said John Neuffer, SIA president and CEO. He expects the market to grow “more modestly in 2018.”

The S&P 500 Semiconductors industry’s consensus expected forward revenue growth is 7.1%, and its expected forward earnings growth is 9.9% (Fig. 2). The industry’s margins are at record highs, but analysts have been continuing to revise their earnings estimates upward (Fig. 3 and Fig. 4).

The same trends are apparent in the S&P 500 Semiconductor Equipment industry. Its consensus expected forward revenue growth is 12.5%, and its consensus expected forward earnings growth is 16.1% (Fig. 5). Here too, margins are at record highs, and estimates continue to be revised upward (Fig. 6 and Fig. 7).

While the industries’ stock indexes haven’t had a banner start to the year—with the S&P 500 Semiconductors index up 1.6% as of Tuesday’s close, and the S&P 500 Semiconductor Equipment index down 3.6%, compared to a 0.4% decline in the S&P 500—the fundamental backdrop remains strong.

**US Dollar: Another Two Cents.** As Melissa and I discussed yesterday, a weaker dollar tends to be bullish for corporate revenues and earnings. More bullish for corporations is global growth. Both makes for an even stronger bullish cocktail.

But is the Fed’s newly appointed chair, Jerome Powell, about to take away the punchbowl? At the ceremonial swearing-in on Tuesday, the chairman said: “[The] Fed’s approach will remain the same. Today, the global economy is recovering strongly for the first time in a decade. We are in the process of gradually normalizing both interest rate policy and our balance sheet.”

In theory, higher interest rates would increase the demand for dollars. But other variables in the current global environment are tugging on the dollar. Most prominently, the strength of the global economy is weakening the dollar in relation to foreign currencies. Despite the Fed’s tightening, Melissa and I think that the dollar could further decline from here. Here’s more about why:
(1) **Strong global economy.** The dollar tends to do well when the US economy is outperforming overseas economies. It tends to weaken when the rest of the world's economies are gaining momentum. It rose 26% from the summer of 2014 through early 2017. That's when the global economy was hard-hit by the drop in commodity prices.

Since early last year, there have been mounting signs of better global economic activity, and that was reflected in the 10% drop in the trade-weighted dollar since then. Not surprising is that our Global Growth Barometer is inversely correlated with the dollar (Fig. 8).

“One of the more remarkable things about [the dollar] selloff is how broad-based it is. The dollar is weaker in 2018 against all major currencies … The breadth of the selloff suggests a thematic trade. These tend to last longer compared to moves based on idiosyncratic rationales,” observed a 1/25 Bloomberg article titled “A Doomsayer’s Guide to the Dollar and Why It Could Keep Plunging.”

(2) **Global tightening tag.** Jerome Powell is likely to conduct monetary policy in one of two ways. Either the new Fed chair will go slow and steady in reversing monetary accommodation, as his predecessor, Janet Yellen, did. Or he will move it along at a faster pace if the US economy begins to heat up too quickly. Either way, it is unlikely that rates in the US will be reduced, or even stay at the abnormally low levels they’re at now. Accepting that reality, will the dollar strengthen when interest rates rise, as it should in theory? Maybe if the Fed were the only central banker in town, but of course it is not.

No longer is the Eurozone in an economic “recovery” phase. Now it’s in an “expansion,” so says the European Central Bank (ECB), according to the 1/11 December monetary policy meeting minutes. So the ECB could move faster to reverse stimulus too. Since the beginning of the year, the euro is up relative to the dollar by 3%. Other central banks around the world are in the same boat.

(3) **America first puts dollar behind.** On January 24, the US Treasury Secretary Steven Mnuchin verbally encouraged a weaker dollar, seemingly ending a streak of the federal government’s support for a stronger dollar. “Obviously a weaker dollar is good for us as it relates to trade and opportunities,” Mnuchin told reporters in Davos, according to CNBC, adding that the currency’s short-term value is “not a concern of ours at all.”

Later, President Trump said that Mnuchin’s comments were taken out of context, reported a 1/25 Bloomberg article. Further, Trump emphasized that that the dollar will get “stronger and stronger” and that he wants to see a strong dollar. But so far, the policies of the current administration seem to be more along the lines of Mnuchin’s comments. Tariffs as well as other protectionist measures are likely to dampen the dollar further.

(4) **China isn’t meddling.** On a trade-weighted basis, the Chinese yuan has surged to a two-year high in recent days, according to a 2/12 WSJ article. That’s as measured by a gauge that pits the yuan against 24 currencies including the dollar, euro, and yen. “Its advance against the dollar since mid-January has begun to stand out when compared with other currencies’ gains against the greenback,” noted the article (Fig. 9).

Surely, Chinese regulators are watching. We are now all on “China watch,” the FT quoted Alan Ruskin of Deutsche Bank as saying. So far, Chinese regulators have allowed the yuan to rise. “China has no shortage of policy tools to limit the yuan’s appreciation against the dollar,” said a senior at the Council on Foreign Relations and a former top US Treasury official quoted in a 1/27 WSJ article. “But a lot of the most powerful tools would require backtracking on key reforms.” According to a roundup of currency analysts posted in a 2/1 Bloomberg article, most expect the yuan to strengthen slightly more from here—meaning that regulators aren’t expected to step in at this point.
(5) *From great heights.* While the dollar may be weakening relative to foreign currencies, it isn’t appropriate to characterize the dollar as weak relative to its recent history. The JPM dollar index already saw dramatic appreciation recently, soaring 26% from a 2014 low of 99.89 on July 1 to a 2017 high of 126.21 on January 11. Since then, the JPM dollar index has given back about 10% of its gains (*Fig. 10*). Based on this and the reasons cited above, it seems reasonable to assume that the index could go even lower from here.

**CALENDARS**

**US. Thurs:** Headline & Manufacturing Industrial Production 0.2%/0.2%, Capacity Utilization 78.0%, Philadelphia Fed Manufacturing Index 21.0, Empire State Manufacturing Index 17.5, Jobless Claims 229k, Housing Market Index 72, Weekly Consumer Comfort Index, EIA Natural Gas Report. **Fri:** Housing Starts & Building Permits 1.232mu/1.300mu, Consumer Sentiment Index 95.5, Import & Export Prices 0.6%/0.3%, E-Commerce Sales, Baker-Hughes Rig Count. (*Wall Street Journal* estimates)

**Global. Thurs:** European Car Registrations, Japan Industrial Production, Australia Employment Change & Unemployment Rate 15k/5.5%, RBA Governor Gives Testimony to Parliamentary Committee. **Fri:** UK Retail Sales 0.6%m/m/2.4%y/y. (DailyFX estimates)

**STRATEGY INDICATORS**

**Stock Market Sentiment Indicators** (*link*): Our Bull/Bear Ratio (BBR) edged up to 3.60 this week after sinking to 3.51 last week; it had been above 5.00 the prior three weeks. The BBR was at 5.25 four weeks ago, which was the highest since early April 1986. Bullish sentiment has plummeted 14.1ppts the past two weeks to 51.9% after 16 weeks at 60.0% or above; it was at 66.7% four weeks ago, which was the most bulls since early April 1986. Most of the bulls fled to the correction camp—which jumped 12.3ppts the past two weeks to 33.7%—its highest reading since November 2016. Bearish sentiment slipped to 14.4% after climbing from 12.6% (fewest bears since early April 1986) to 15.5% last week. The AAII Ratio fell for the third week last week from 71.7% to 51.4% over the period. Bullish sentiment fell from 54.1% to 37.0% over the three-week span, while bearish sentiment rose from 21.4% to 35.0%.

**S&P 500 Q4 Earnings Season Monitor** (*link*): With over 72% of S&P 500 companies finished reporting earnings and revenues for Q4-2017, their revenue and earnings surprise metrics are mostly better compared to the same point during the Q3 earnings season. Q4-2017 is on track for a sixth straight quarter of positive y/y earnings growth, a seventh quarter of positive y/y revenue growth, as well as the highest y/y revenue and earnings growth since Q3-2011. Of the 361 companies in the S&P 500 that have reported through mid-day Wednesday, 77% exceeded industry analysts’ earnings estimates by an average of 4.8%; they have averaged a y/y earnings gain of 16.3%. At the same point during the Q3-2017 reporting period, a lower percentage of companies (75%) in the S&P 500 had beaten consensus earnings estimates by a slightly higher 5.1%, and earnings were up a lower 8.9% y/y. On the revenue side, 78% beat sales estimates so far, with results coming in 1.3% above forecast and 8.7% higher than a year earlier. At this point in the Q3 season, a lower 67% had exceeded revenue forecasts by a higher 1.5%, and sales had risen by a lower 6.5% y/y. Q4 earnings results are higher y/y for 79% of companies vs a lower 72% at the same point in Q3, and revenues are higher y/y for 87% during Q4 vs a lower 82% a quarter ago. These figures will continue to change as more Q4-2017 results are reported in the coming weeks. Q4’s early results on revenues are very encouraging, particularly with the percentage of companies growing y/y and their y/y growth rate.

**US ECONOMIC INDICATORS**
Retail Sales (link): Consumers have been taking a break from shopping, suggesting that consumer spending may be weaker than expected this quarter. January retail sales posted its biggest decline in nearly a year, while December’s increase was revised away. January retail sales slumped 0.3%—the biggest decline since last February, while December’s 0.4% gain was revised to unchanged. Core retail sales were flat last month, following a 0.2% loss in December, first reported as a 0.3% gain. (BEA uses this core retail sales measure to estimate personal consumption expenditures each month.) We estimate real retail sales dropped 1.2% in January after flat sales in December. These sales rose 3.1% (saar) during the three months through January, based on the three-month average, half Q4’s 6.4% advance. Real core retail sales sank 1.0% last month following a 0.2% decline in December. These sales rose 3.0% (saar) over the comparable three-month period, half the recent peak rate recorded in mid-2017. Five of the 13 major nominal retail sales categories rose in January, five fell, while sales were flat for restaurants, food & beverage stores, and nonstore retailers. Sales rose more than 1.0% for gasoline stations (1.6%), miscellaneous store retailers (1.6), and clothing stores (1.2), while sales for electronics & appliance and general merchandise stores were fractionally higher. The biggest declines were recorded by building materials (-2.4), auto (-1.3), and health & personal care (-1.2) retailers. Ending on an up note: Our Earned Income Proxy, which has a close relationship with retail sales, continued to set new record highs through January, suggesting that the recent slowdown in consumer spending is likely temporary.

Business Sales & Inventories (link): Nominal business sales in December and real sales in November once again reached new record highs. The details: Nominal manufacturing & trade sales (MTS) have posted only one decline the past 17 months, rising 0.6% in December and 10.5% over the period. Inflation-adjusted MTS rebounded 3.5% in the seven months through December after slumping 1.0% the first four months of the year. Real sales of both retailers and wholesalers climbed to new record highs in December, while manufacturers’ sales reached a new cyclical peak. November’s real inventories-to-sales ratio fell to 1.40—the lowest since mid-2013; December’s nominal inventories-to-sales ratio held at 1.33—its lowest reading in three years.

CPI (link): The core CPI rate in January remained below the Fed’s target rate of 2.0% y/y for the tenth month, after 15 months above—ranging from 2.1% to 2.3%—from December 2015 through February 2016. The yearly rate held at 1.8% last month, where it’s been three of the last four months, after five months at 1.7%. Meanwhile, the three-month rate accelerated 2.8% (saar), the highest since August 2011. On a monthly basis, core prices began 2018 with a 0.3% rise, which was how it began 2017; in between, core prices rose either 0.1% or 0.2%—except for a 0.1% downtick last March. Among the indexes posting gains last month were shelter, medical care, apparel, used cars & trucks, motor vehicle insurance, and personal care, partially offset by lower prices for air fares and new vehicles. The headline CPI rose 0.5% after slowing from 0.3% to 0.2% in December; the yearly rate was unchanged at 2.1%; it’s been hovering around that rate the past five months.

GLOBAL ECONOMIC INDICATORS

Eurozone GDP (link): The Eurozone economy grew 0.6% last quarter, according to the GDP flash estimate, slightly below the 0.7% increases the prior two quarters. Among the four largest economies, Spain (0.7%) was the only one to exceed the Eurozone’s real GDP growth, while France (0.6) and Germany (0.6) matched it; Italy’s (0.3) GDP grew at half the pace. France was the only one of the four to show an acceleration during the quarter.

Eurozone Industrial Production (link): Output in December rose to another new cyclical high. Industrial production (excluding construction) expanded 0.4% after an upwardly revised 1.3% gain in November, first reported as a 1.0% advance. It was the fifth gain in six months, for a total jump of 3.4%. The increase in December production was fairly widespread, with consumer durable goods (2.7%),
intermediate goods (1.4), energy (1.3), and consumer nondurable goods (0.7) output all in the black; capital goods production sank 1.1% after a 3.5% jump in November. Over final six months of 2017, impressive gains were recorded for capital (5.1%), consumer durable (4.7), and intermediate (4.3) goods production, followed by gains of 2.0% and 1.3%, respectively, for consumer nondurable goods and energy output. Among the top four Eurozone economies, only Germany (-0.5%) recorded a decline in production; Italy, Spain, and France posted gains of 1.6%, 0.9%, and 0.5%, respectively. The biggest gains were recorded by Ireland (3.0), Slovenia (2.7), Luxembourg (2.5), and Estonia (2.5), while Slovakia (-2.7) and Lithuania (-2.6) posted the biggest declines. Production for the Eurozone remains bright: January’s M-PMI (59.6) was just a point below December’s record high of 60.6. The Netherlands (62.5) topped the leader board, with its M-PMI at a new record high; Austria (61.3) and Germany (61.1) were not far behind with readings above 60.0. Also posting impressive numbers were Italy (59.0, 83-month high), France (58.4), Ireland (57.6), Spain (55.2), and Greece (55.2, 123-month high).