



**CAUTION:
Speed bumps ahead**

2018 was a pretty good year for the global electronics sector. Strong GDP growth in the U.S. and China and solid growth in Europe has driven industrial and consumer spending higher, which has buoyed growth for electronic equipment in a variety of end markets. U.S. industrial, automotive, medical, and defense electronics all posted growth rates in the low double-digits for the third quarter of 2018, according to Custer Consulting.

A case in point is worldwide server shipments for the enterprise markets, which set a record in the second quarter of 2018, increasing 20.5% year-over-year and generating record revenue of \$22.5 billion for server vendors, according to IDC. The reason? The IT enterprise refresh cycle and increasing demand from cloud service providers that are powering the expanding digital economy. Datacenter and cloud services demand fueled strong demand for memory chips, CPUs, GPU, and ASICs.

As a consequence, the global semiconductor market is on track to set a record for annual sales this year, according to John Neuffer, CEO of the Semiconductor Industry Association. “September marked the global industry’s highest-ever monthly sales, and Q3 was its top-grossing quarter on record,” Neuffer said in a statement. “Year-to-year sales in September were up across every major product category and regional market, with sales into China and the Americas continuing to lead the way.”

However, signs are emerging that global economic growth will be lower in 2019, especially for advanced economies like the U.S. (Fig. 1). There are even signs that a US recession may be in the cards, The Wall Street Journal reported in early December. According to the International Monetary Fund (IMF), U.S. GDP growth will be 2.5% in 2019, down from 2.9% 2018; the Euro Zone will grow by 1.9% next year, down from 2.0% this year; and Japan’s 2019 growth will be 0.9%, down from 1.0%. The IMF projects China’s GDP growth will moderate to 6.2% in 2019, down from 6.9% this year.

1. Year-over-year real GDP growth by country group



Source: IMF, World Economic Outlook, October 2018.
Note: Grey area denotes projections.

As economic growth slows, analysts expect the electronics sector to follow suit. Indeed, [IC Insights](#) projects that worldwide all major electronics sectors will grow more slowly in the coming year, posting an aggregate growth rate of 3.5%, down from 5.1% in 2018 and 5.9% in 2017 (Fig. 2).

2. All electronics sectors are forecast to post slower growth in 2019.

Worldwide Electronic System Production by System Type (\$B)

System Type	16	17	17/16 %	18F	18/17 %	19F	19/18 %	17-21 CAGR
Communications	460	490	6.5%	515	5.1%	535	3.9%	4.8%
Computer*	387	404	4.4%	418	3.5%	427	2.2%	3.3%
Ind/Med/Other	210	223	6.2%	236	5.8%	245	3.8%	5.4%
Consumer	174	185	6.3%	197	6.5%	204	3.6%	4.5%
Automotive	131	142	8.4%	152	7.0%	162	6.3%	6.4%
Gov/Military	95	99	4.2%	104	5.1%	107	2.9%	3.8%
Total	1,457	1,543	5.9%	1,622	5.1%	1,680	3.5%	4.6%

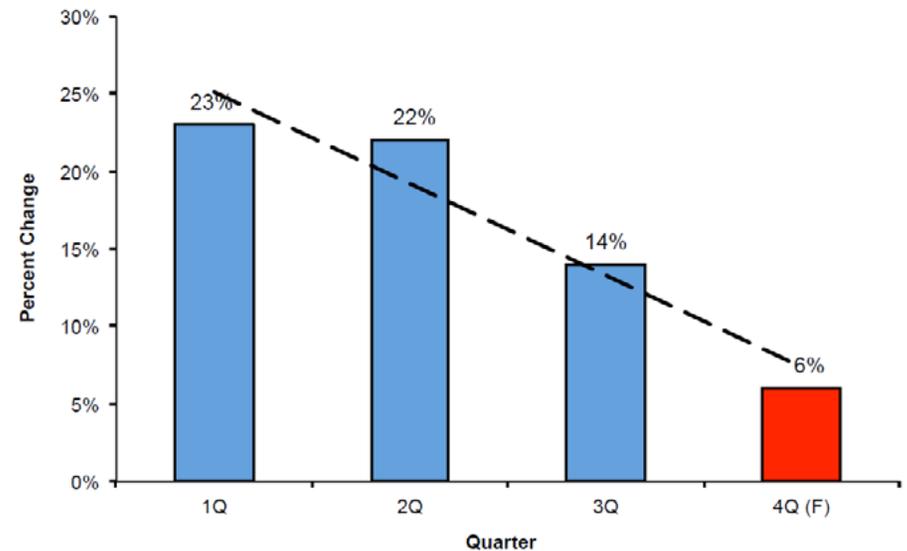
*Includes tablet PCs.

Source: IC Insights

There is a growing consensus among [industry analysts](#) that the semiconductor sector will enter a cyclical correction of slow—or perhaps negative—growth in the first half of 2019 due to a slowdown in demand from enterprise customers and a buildup of inventory. The signs are already evident: [IC Insights](#) is projecting a modest 6% year-over-year market growth rate for ICs in Q4 2018, due in part to a softening in the memory chip market (Fig. 3).

3. Slower IC market growth rates could turn negative in 2019.

2018 Quarterly Year-over-Year IC Market Growth



Source: WSTS, IC Insights

Custer Consulting's Walt Custer concurs. Semiconductor growth rates have peaked in all regions, and semiconductor capital equipment revenues are growing at a much slower pace, he said. This view is corroborated by Bill Bradford, president of ECIA, a trade association that includes members from across the electronics component and distribution supply chain. "After several quarters of increasing sales, order rates have decreased, inventory is building, lead times have flattened out, and there have been price decreases," said Bradford.

Looking ahead, Bradford said ECIA members expect a softer market in the first couple of quarters of 2019 as they work through the inventory correction, but most indicate that the fundamental drivers of demand are solid.

One relative hotspot is the automotive sector. IC Insights projects vehicle electronic systems are forecast to increase 7.0% in 2018 and 6.3% in 2019, posting the highest growth rate for both years of the six major end-use markets for semiconductors. The auto sector's growth is being driven by increasing demand for a diversity of advanced driver assist systems and digital connectivity. And with the introduction of 5G mobile networks in the coming years, autonomous driving systems for vehicles and roadside infrastructure will fuel further growth.

Still, the auto electronics market represents less than 10% of the total global market. Communications and computing account for 57% of the overall market and are projected to grow at modest rates of 3.9% and 2.2% in 2019, respectively, according to IC Insights.

The Elephant in the Room

Of course, global market forecasts should be taken with a grain of salt. Their value and accuracy depend on many things: the quality of the data, model assumptions, the frequency of updates, and the level of confidence in the stability of economies and geopolitical relationships.

"We know that things often turn out to be quite different from even the most careful forecasts," warned U.S. Federal Reserve Chairman Jerome Powell in a speech in late November. Powell was commenting on the expansion of the U.S. economy and the low risk of an outbreak of inflation, as reported by [The Wall Street Journal](#).

Powell's words are prescient at the close of 2018 as the world faces the prospect of a retreat from globalization, which has shaped the modern electronics supply chain for decades. At center stage is the threat of a protracted trade war between the U.S. and China. Other threats include the uncertainty about the final form that [Britain's March 2019 exit from the EU](#) will take. A "hard" Brexit could disrupt manufacturing operations and supply chains across Europe.

And then there is the uncertainty over the ratification of the U.S., Mexico, and Canada ([USMCA](#)) Trade Agreement, which will replace NAFTA. The new agreement was signed on November 30 at the G20 meeting in Argentina by the nations' three leaders but still requires ratification by the three legislatures. This is [not a foregone conclusion](#).

“The wildcard for 2019 is geopolitics, specifically trade with China,” said ECIA’s Bradford. When the group polled member companies in August, there was a sense that the tariffs would have little to no impact. But by November, about 80% of ECIA members said tariffs and trade-related issues were going to have a negative impact on their business. “It’s more than a temporary phenomenon now,” Bradford said. “Companies are preparing for the trade war to be the new normal for the foreseeable future.”

In July, the International Monetary Fund estimated the cost of the trade war at \$430 billion, which represents a dip of 0.5% in world GDP. And in October, the IMF cut its U.S. GDP growth forecast for 2019 to 2.5%, down from its July forecast of 2.7%, and China’s 2019 GDP rate to 6.2% from 6.4%.

“U.S. growth will decline once parts of its fiscal stimulus go into reverse,” IMF Chief Economist Maurice Obstfeld said in a statement, as [reported by CNBC](#). “Notwithstanding the present demand momentum, we have downgraded our 2019 U.S. growth forecast owing to the recently enacted tariffs on a wide range of imports from China and China’s retaliation.”

There’s a direct consequence of the trade war for the electronics sector: According to industry sources, more than 200 items on the U.S. tariff list directly impact the semiconductor manufacturing process from materials, test, and inspection to machines and tools used to make wafers, circuits, and components. Should the trade war continue, and possibly expand, it will be a drag on the U.S. electronics industry’s financial performance.

The challenge now for many companies is to make tactical adjustments to account for the tariffs. Do they pass the cost along to their customers? If so, is it a line-item in the invoice or is the cost baked into the price? At the same time, companies must work on the more strategic challenges of adapting their supply chains to be less reliant on sourcing from China. This includes sourcing from suppliers in countries like Vietnam or Mexico.

Electronics component makers and distributors are reviewing how goods flow through their global supply networks and how they can minimize the impact of the tariffs, according to the ECIA’s Bradford. For example, a component that is made in China might be processed through a U.S.-based distribution center before being sent to a manufacturing plant in Mexico. A workaround would be to locate the U.S. distribution center in a free trade zone or ship the component directly to a manufacturing plant in Mexico.

Of course, not all companies can shift production easily from a supplier in China to another elsewhere in the world. Many suppliers and OEMs have spent years qualifying manufacturing plants around the world, including in China. Indeed, many items required to manufacture a finished packaged semiconductor are not available outside China, according to industry sources.

Addressing the Root Cause

The origins of the U.S.-China trade war that the Trump Administration initiated earlier this year can be traced to a [U.S. Trade Representatives \(USTR\) Report](#) published in March, which asserts that China’s alleged unfair trade practices violate international law. The report argues that the Chinese government interferes to regulate and intervene in U.S. corporate operations in China and pressures them to transfer technology and intellectual property to Chinese companies.

In 2017, the Department of Commerce’s Bureau of Industry and Security reported that 25 U.S. semiconductor companies—that combined, accounted for more than \$25 billion in annual sales—had said the Chinese government required them to form joint ventures with Chinese entities and transfer intellectual property to obtain or maintain access to the China market, as detailed in the USTR Report. Cloud service providers had similar experiences of being pressured to transfer technology to Chinese cloud service providers to gain market access.

Also, the USTR Report asserted that the Chinese government reportedly directed investment in and acquisition of U.S. companies to obtain access to technologies and intellectual property in industries deemed important by Chinese government industrial plans. The U.S. Commission on the Theft of Intellectual Property alleged theft by China of American IP costs to be between \$225 billion and \$600 billion annually.

The U.S. strategy is that the threat of a prolonged trade war will convince China to change its practices for how it acquires intellectual property and shift away from a model of state-sponsored industrial development. The central question is whether China will bow to US pressure and agree to play by U.S. rules.

The evidence to date suggests China's government involvement in industrial and technological development is only just now hitting its stride. While short-term trade concessions may be possible, a fundamental political course correction is unlikely. A number of government-sponsored and corporate projects that directly impact the electronics sector are evidence that China is taking the long view. Here are a few examples:

1. In June 2014, China released the [Promotion of a National IC Industry Development Guidelines](#), which call for the development of an entire indigenous semiconductor industry ecosystem within China, with the goal of becoming the global leader in all major segments of the industry by 2030, as detailed by the [Semiconductor Industry Association](#) in September. One objective of this effort is to increase China's semiconductor industry's share of the domestic market from just under 20% today to a minimum of 70% by 2025.

2. In March 2017, China's National Development and Reform Commission approved Baidu, China's dominant search company, as the leader of the country's new [National Engineering Lab of Deep Learning Technology and Application](#). Baidu will collaborate with Chinese universities for AI research in areas such as visual perception, speech recognition, and human-machine interaction.
3. Last July, China's State Council declared that China plans to become the world leader in [AI innovation by 2030](#), surpassing the U.S. and Europe to develop a domestic industry worth \$150 billion, which includes both commercial and military applications of the technology. This raised concerns in the U.S. Department of Defense since Chinese companies are investing in American AI companies as well. The State Council expects to be at parity with the U.S. in AI by 2020.
4. In October 2017, Alibaba announced plans to invest \$15 billion over the next three years in research focused on [quantum computing and AI](#). The company plans to build seven labs in four countries—Beijing and Hangzhou in China; San Mateo and Bellevue in the U.S.; Moscow; Tel Aviv; and Singapore—and collaborate with university programs including UC Berkeley's RISE Lab.
5. Not to be left behind, the country's leading social media company, [Tencent, has been pouring resources into AI](#), including setting up a research lab last year. Tencent is reportedly establishing an additional AI research lab in Seattle, demonstrating a growing determination to master a technology that looks set to define the future of many industries.

On the Positive Side

While the U.S. trade war with China is expected to put a damper on GDP growth for both countries and raise the costs of doing business for the global electronics industry, there are a few bright spots on the technology horizon that could moderate its impact.

The foundational technology is the 5G wireless service, which telecom providers have started rolling out now the 3rd Generation Partnership Project has finalized the standard. Korea led the way with a pilot 5G installation for the PyeongChang Winter Olympics in February. In the US, AT&T has plans to install 5G in a few cities by the end of 2018 and Verizon has scheduled a 5G rollout in Sacramento. Sprint and T-Mobile both plan to roll out 5G services starting in early 2019.

Service providers are expected to accelerate their 5G infrastructure projects in 2020, and by 2021 the number of 5G connections will perhaps reach 100 million worldwide, according to [Statista](#). However, it will be another few years before the number of connections will reach a billion

The 5G infrastructure market alone is estimated to be valued at \$3 billion in 2020 and reach \$33.72 billion by 2026, growing at a CAGR of 50.9% over this period, according to [Markets and Markets](#). IDC is a bit more sanguine. It expects the total 5G and 5G-related network infrastructure market to grow from just over \$500 million in 2018 to \$26 billion in 2022 at a compound annual growth rate of 118%. IDC expects 5G RAN to be the largest market sub-segment through the forecast period.

As the 5G buildout expands, it will spawn markets for consumer 5G-ready mobile devices, such as augmented and virtual reality glasses and headsets, that can take full advantage of the speed and bandwidth of 5G services.

Then there's the burgeoning market for IoT networks that will enable autonomous driving, smart buildings and cities, and industrial applications for smart supply chains and factories in the next decade. The global IoT market is expected to grow from \$1.2 trillion in 2017 to \$6.5 trillion in 2024, at a compounded annual rate of 26.6% between 2018 and 2024, according to [Energias Market Research](#). The company expects North America to account for the largest share of the global IoT market during the forecast period, while the Asia-Pacific region will be the fastest growing IoT market.

5G is coming, and in its wake a new generation of powerful technologies that will spur growth across the electronics industry. At the same time, there's little doubt that the present geopolitical threats to the world economy and the electronics industry will have consequences in 2019. The more agile and responsive your business can be, the better the chances of threading the needle.

It might be wise to keep Fed Chairman Powell's comment in mind that "things often turn out to be quite different from even the most careful forecasts."

By Bruce Rayner, Contributing Editor

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