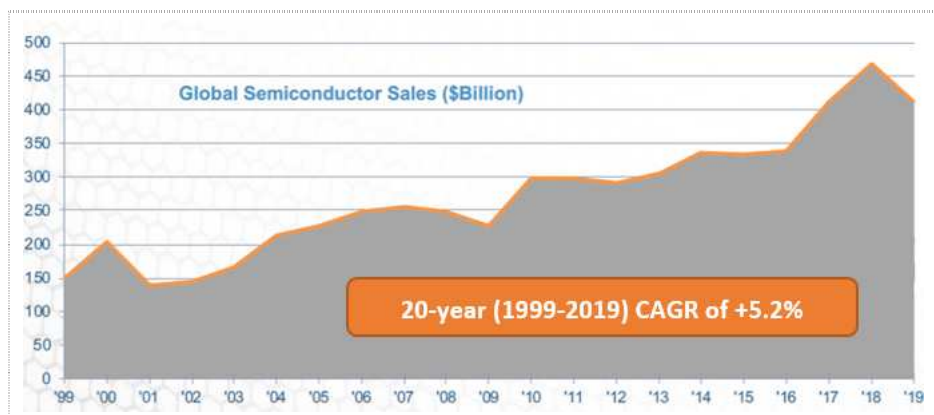


To Infinity and Beyond

NASA's most sophisticated rover, Perseverance, landed successfully on the Jezero Crater, Mars on February 18, 2021, following its seven-month cruise through space. Getting a spacecraft to the launch pad (during a pandemic, no less) and navigating through the harsh space environment are no easy feats, nor is a soft touchdown on Mars, since only ~40-50% of all Mars landing attempts have ever been successful. All told, Perseverance's success thus far would not have been possible without some very essential components on board – *semiconductors*. Perseverance was fitted with thousands upon thousands of some of the most sophisticated mission-critical chips powering everything from rover subsystems, such as the flight computer, motor control, radar, and mission instrument suite, to the rover's 19 cameras.

As essential as semiconductors were in landing Perseverance successfully on Mars, for the rest of us here on Earth, these silicon chips represent essential building blocks behind modern-day electronics and the technology "brain" that powers many of the cutting-edge digital devices we use today including, PCs, laptops, phones, cars, etc. We believe that the global semiconductor industry is set to accelerate its growth above its long-term average of ~5.2% (20-year compounded annual growth rate, or CAGR), well into the next decade. We expect this growth will be supported by emerging technologies such as autonomous driving, artificial intelligence, 5G, and the Internet of Things. Moreover, population growth, rising disposable incomes, and increasing urbanization are expected to further support demand trends for consumer electronic devices over the next decade which we expect will span beyond communication devices and computers (~60% of global semiconductor sales in 2019). Given this favorable outlook we believe investors should maintain a core exposure to this growing and vital industry within their investment portfolios.

1999-2019: Global Semiconductor Sales CAGR of +5.2%



Source: Semiconductor Industry Association (SIA), Raymond James Ltd.

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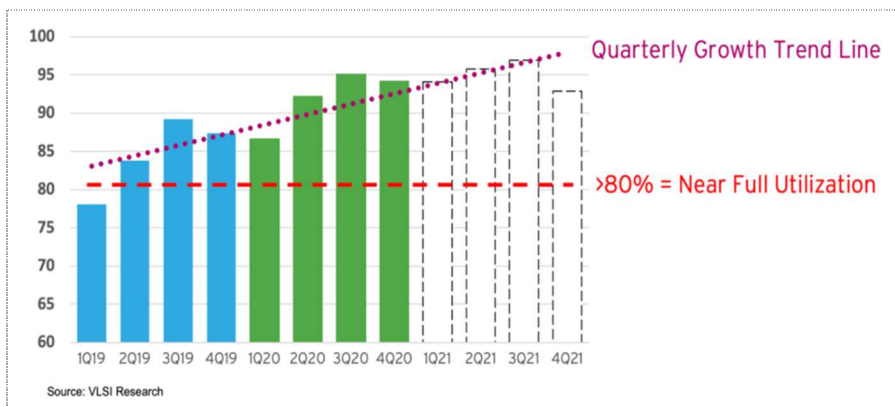
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Chip shortages just a short-term headwind

The current chip shortages we are seeing across the semiconductor industry was the result of the substantial swings in demand across end markets caused by the COVID-19 pandemic. Early in the crisis, automotive, industrial, and some consumer end-markets reduced production as a result of global lockdown measures, which saw consumer and enterprise spending deteriorate materially as the virus spread across the globe. Meanwhile, the lockdowns vastly increased work-from-home (WFH), learn-from-home (LFH), and various other end-markets, which facilitated these activities. For example, cloud computing companies realized a noticeable uptick in demand as most of the population migrated to WFH/LFH, while at same time, these very consumers demanded PCs and other electronic devices to facilitate the shift to the “everything at home” environment.

The rapid recovery in the global economy, thanks to the +US\$20 trillion in stimulus measures (according to recent estimates by the IMF) introduced by governments globally, resulted in a strong resurgence in consumer and corporate demand for electronics, including autos, machinery, etc. This rapid surge resulted in a supply shortage for the global semiconductor industry. As a result, companies across several industries have had to slow/reduce production (e.g., automotive industry), while many semiconductor companies have been unable to ship their full capacity. Unfortunately, increasing semiconductor production takes time because semiconductors are incredibly complex to produce. In fact, according to the Semiconductor Industry Association (SIA), making a chip is one of the most, if not the most, capital- and R&D-intensive manufacturing processes on earth. That said, we expect these supply challenges to begin to normalize over the next 3-6 months as semiconductor fabrication facilities increase their utilization rates closer to 90-100% to meet the increase in demand. Moreover, we have also begun to see semiconductor companies begin to build their own inventories to ensure they can meet end-market demand.

Quarterly Fabrication Facility Utilization Levels (2019-2021)



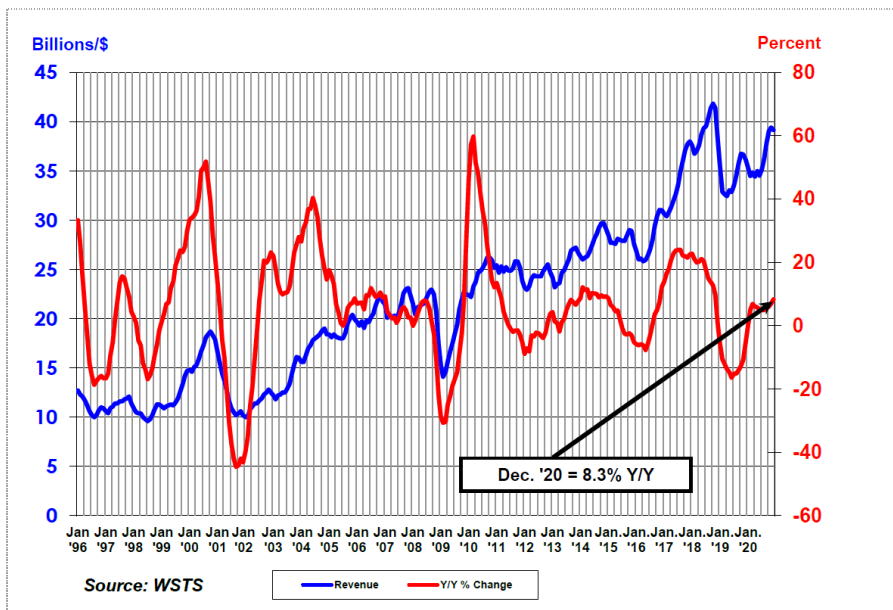
Source: Semiconductor Industry Association (SIA), Raymond James Ltd.

Bucking the trend

Despite a challenging macroeconomic environment brought on by the pandemic and other factors, the global semiconductor industry proved to be resilient with 2020 sales of \$439.0 billion (+6.5% year-over-year/YoY), above the longer-term average of +5.2%, according to the latest figures published by the World Semiconductor Trade Statistics (WSTS). For 2021, WSTS is forecasting global sales to increase by +8.4% YoY.

Traditionally viewed as a very cyclical industry, the growth in the industry during 2020 showed how critical semiconductors are to the global economy and demonstrates the world's increasing reliance on advanced technologies. We expect semiconductors will remain a vital component as the economy recovers from the pandemic and expect that this growth will be supported by emerging technologies such as autonomous driving, artificial intelligence, 5G, and the Internet of Things, which we believe will also result in a less volatile industry supply/demand profile in the years ahead. Moreover, while we anticipate the current chip shortages will remain a headwind over the near-term, we believe that the impacts of COVID-19 on the industry appears to be more favourable longer-term, including accelerating digital adoption (e.g., cloud, AI, etc.), than those in other sectors.

Global Semiconductor Revenues & YoY % Change (1996-2020)



Source: WSTS, Raymond James Ltd.

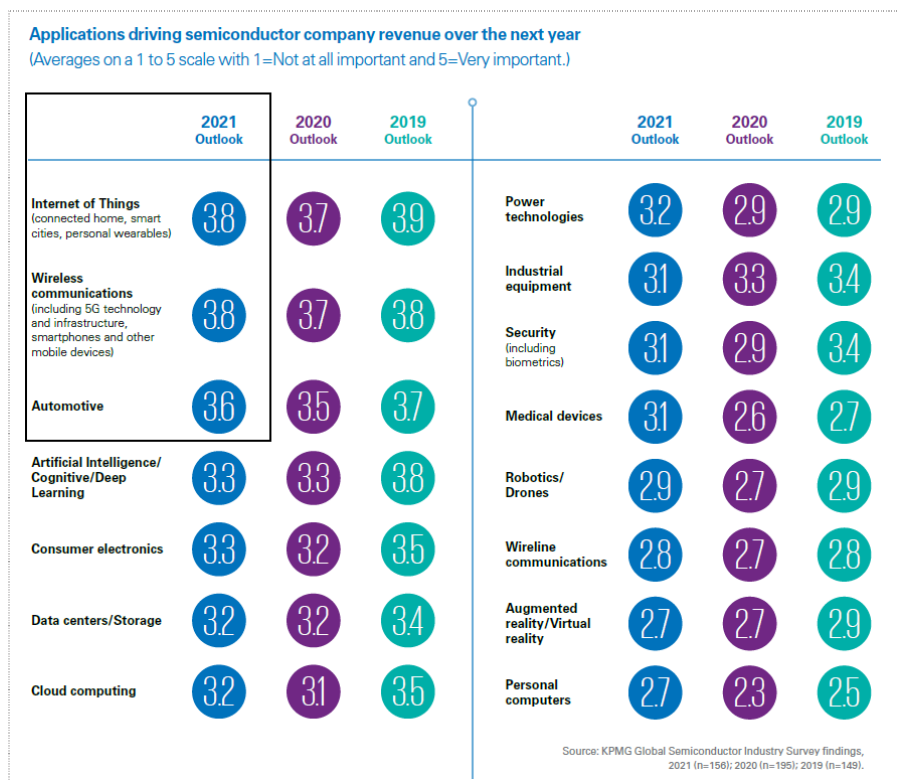
Growth opportunities across the industry

While we remain positive on the outlook on the semiconductor industry over the long-term, in 2021 we expect certain segments of the market to fair better than others. To help support our findings we reviewed the latest commentary for the largest US semiconductor companies, following Q4/2020 reporting season, and also reviewed the latest KPMG Global Semiconductor Industry Outlook report, which summarized their findings after surveying 156 semiconductor CEOs.

Some of the key takeaways from this analysis showed that semiconductor companies expect revenue, industry profitability, capital spending, and R&D investments to increase over the next year and beyond. In terms of growth, wireless communication (including 5G) and the Internet of Things ranked as the most important applications expected to drive semiconductor revenue growth in 2021. Looking out further, we expect these applications will remain focus areas for growth for the semiconductor industry as a whole at least for the next decade. Also, while the chip shortage issues facing the auto industry has been discussed ad nauseam, automotive applications came in as the third most important driver of growth for the semiconductor industry over the next year. We however, believe automotive applications will continue to

remain an important area of growth for the industry as the demand for exponentially smarter, safer, and more efficient vehicles continues to grow. Applications such as cloud computing, data centers, artificial intelligence, and consumer electronics were also areas that semiconductor CEOs identified as growth areas in 2021, however, these applications came in below wireless communication, the Internet of Things, and automotive.

Applications Driving Semiconductor Revenue Growth in 2021



Source: WSTS, Raymond James Ltd.

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<https://raymondjames.bluematrix.com/sellside/Disclosures.action>

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