ROBOGLOBAL®
INVESTING IN THE ROBOTICS & AI REVOLUTION

SECOND QUARTER IN REVIEW

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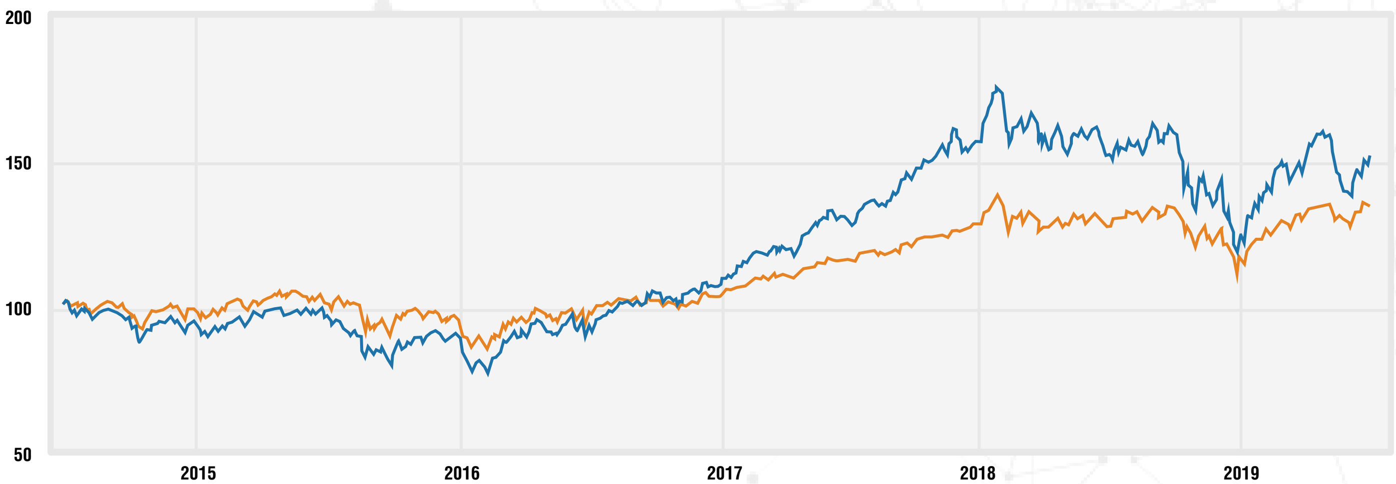
SUMMARY

While markets are sending mixed signals, robotics, automation, and AI stocks recorded further gains in a volatile Q2. Halfway into the year, the ROBO Global Robotics & Automation Index (ROBO) has returned more than 22%, and the ROBO Global Artificial Intelligence Index (THNQ) increased by 30%, both largely outperforming global equities. We believe that Q2 marked the bottom in earnings trends, with sales set to accelerate after six consecutive quarters of slower growth. The ROBO Index is currently trading on a forward P/E of 22x, in line with its five-year average.

Performance Chart

Rebased 100 = June 30, 2014



	YTD	3 Year	5 Year
ROBO GLOBAL ROBOTICS AND AUTOMATION INDEX	22.37%	17.91%	8.74%
WORLD EQUITY INDEX	16.23%	11.63%	6.16%

Periods greater than one year have been annualized

Robotics, automation, and AI stocks rose in Q2, pushing the ROBO Index up 22% year-to-date

After a spectacular comeback in the first quarter, global equities edged up in Q2, led by technology and momentum stocks in the US and developed markets, while China lagged on renewed US trade policy concerns. The MSCI AC World Index ended Q2 up 3.6% after falling nearly 6% in May and then recovering 6.5% in June, reflecting unprecedented uncertainty around the sustainability of global growth. The current economic expansion is now the longest on record, but it has lost steam and sliding bond yields have investors on the defense. All eyes are on the Fed, which is expected to deliver its first rate cut in more than ten years, as well as on the US-China trade negotiations, which took a positive turn just days before the mid-year mark as the two countries' presidents agreed to resume negotiations. In our view, barring any exogenous shock, economic growth is likely to turn up later in the year in most regions of the world due to an expanding US economy and the bottoming out of global manufacturing activity.

The ROBO Global Robotics & Automation Index (ROBO) returned 3.4% in 2Q19, extending its gains to more than 22% year to date, compared with 16% for the MSCI World Index. Energy (+29%), 3D printing (+10%), and logistics automation (+8%) led the gains, while consumer (-22%) and security (-18%) declined. Importantly, manufacturing & industrial automation gained (+7%) for a second consecutive quarter after weighing heavily on the index in 2018. This comforts our view that factory automation has hit the bottom and is about to enter a new up cycle. Despite renewed fears of escalation in US tariffs hitting capital investment plans in May, orders of factory automation equipment in China appear to have stabilized and manufacturing PMIs around the world are at the point where they have typically bottomed in prior industrial cycles. By region, the US (+4%), Japan (+4%), and Switzerland (+14%) were the top contributors, while China (-14%), the UK (-10%), and Korea (-4%) declined.

While this gain leaves the ROBO index roughly unchanged over the past twelve months, it brings annualized returns to 17.3% and 8.4% over the past three and five years, respectively, significantly outperforming the 11.2% and 5.9% returned by the MSCI AC World Index over the same periods. More details are available on the **ROBO Global Robotics & Automation Index Factsheet.**

2Q PERFORMANCE

Total return by subsector (%)	Q2 2019	YTD
INDEX TOTAL	**3%**	**22%**
3D Printing	10%	8%
Actuation	-2%	25%
Computing, Processing, & AI	3%	23%
Consumer Products	-22%	9%
Energy	29%	71%
Food & Agriculture	5%	18%
Healthcare	-0%	17%
Integration	2%	15%
Logistics Automation	9%	39%
Manufacturing & Industrial Automation	7%	28%
Security	-18%	-34%
Sensing	6%	20%

The Healthcare Technology & Innovation Index (HTEC), which seeks to capture the growth and returns opportunity presented by the convergence of robotics, machine intelligence, and life sciences, launched on 1 May 2019 and returned 5.8% in May and June 2019, led by genomics (+11%) and lab process automation (+8%), while regenerative medicine (-7%) and telehealth (-1%) declined. The Healthcare Technology & Innovation Index returned an annualized 32.0% in the past three years and 23.7% in the past five years (periods prior to 1 May 2019 represent a back test). More details are available on the **ROBO Global Healthcare & Technology Innovation Index Factsheet.**

The Artificial Intelligence Index (THNQ) returned 3.1% in 2Q19 after a 26.3% gain in the first quarter. By sector, top contributors were healthcare (+23%), e-commerce (+18%), and cognitive computing (+7%), while networking & security (-9%) and cloud providers (-11%) declined. The Artificial Intelligence Index returned an annualized 36.3% in the past three years and 24.9% in the past five years (periods prior to 22 August 2018 represent a back test). More details are available on the **ROBO Global Artificial Intelligence Index Factsheet.**

MOVERS & SHAKERS

ROBO Global Robotics & Automation Index

Qualcomm (+34%), the digital communication technology company, finally settled its worldwide litigation with Apple and later said it expected an additional $2 in earnings per share as a result, sending its stock to a five-year high in May. The legal overhang had persisted for two years. We believe its removal will let investors refocus on Qualcomm's core business and clear leading position in 5G modem technology, which is ramping up coming into 2020.

Brooks Automation (+32%), the life sciences and semiconductor fab automation provider, closed on the $675M sale of its semi cryogenic pump business, which had been delayed by European regulators. The sale, combined with the $450M acquisition of genomic services provider Genewiz, has accelerated the company's transition to higher growth life sciences automation, with a leading position in bio sample management and now a foot in the $2B genomic services market.

BioTelemetry (-23%), the leader in mobile cardiac monitoring, reported mixed results as organic sales growth slowed to the high single-digits, which may be due to temporary system upgrade dynamics. However, management raised its full-year guidance to reflect the acquisition of Geneva, an innovative cloud-based platform for cardiac data, which will provide physicians with a single portal for patient monitoring.

iRobot (-22%), the maker of the Roomba robotic vacuum cleaner and other automated solutions for the connected home, gave back some of its outstanding Q1 gains (+44%) as the US government moved to increase tariffs on Chinese goods from 10% to 25% starting 1 June. While the US-China trade negotiation has now resumed and iRobot is taking mitigating actions, including shifting some production to Malaysia, the company's earnings power is temporarily reduced.

ROBO Global Healthcare & Technology Innovation Index

Natera (+44%) is a genetic testing and molecular diagnostic company whose products span reproductive and prenatal health, oncology, and organ transplants. In May, the company received FDA "Breakthrough Device" designation for Signatera, a test that can detect residual cancer in patients up to two years sooner than standard imaging. In June, Natera launched a nationwide study for a test that helps detect post-surgical rejection of kidney transplants, which it plans to commercialize later this year.

Novocure (+43%) discovered a new cancer treatment known as Tumor Treating Fields, which uses electric fields to disrupt and inhibit tumor growth, causing affected cancer cells to die. The company already has two FDA-approved indications for this therapy. In May, Medicare announced it will cover this treatment in patients with newly diagnosed glioblastoma, the most aggressive brain cancer. In addition, the FDA approved the treatment for malignant pleural mesothelioma, a type of lung cancer. Novocure has six more indications in the pipeline, including four in Phase III.

Align Technology (-16%) manufactures the Invisalign clear teeth aligner, along with scanners and software to facilitate usage of the device. The company reported record Q1 revenue growth of 26% YoY. However, shares were under pressure during the quarter as the International Trade Commission ruled that its competitor 3Shape was not in infringement of Align's patents, essentially expanding Align's domestic competitive landscape. However, with the market for clear aligners in early stages of growth and vastly under-penetrated, Align's continued innovation and best-in-class production capabilities suggest its market share will remain resilient.

Axogen (-16%) is a pioneer in nerve regeneration and the provider of the only commercially available nerve allograft to repair peripheral nerves. While revenue grew 35% in Q1, earnings disappointed as the company accelerated hiring to build market awareness for its new products. As Axogen continues to develop its broader capabilities, we see the company sustaining its revenue growth of +30% driven by surgeon adoption and market expansion into new applications.

ROBO Global Artificial Intelligence Index

Shopify (+45%), which operates a mobile centric e-commerce platform for small to medium businesses, delivered strong earnings across the board. Revenue is up 50% YoY and orders processed on Shopify Pay in the quarter more than doubled to over 10 million transactions. Shopify is successfully transitioning into a global retail operating system that spans order fulfillment and brick-and-mortar, fueled by a combination of its technological innovation and a strong partner ecosystem.

Cray (+33%), the supercomputer company, accepted a $1.4B acquisition offer by HP Enterprises. Cray's architecture will allow HP to offer a comprehensive end-to-end portfolio for the fast-growing high-performance computing and artificial intelligence markets. Cray also announced a record $600M contract when its Shasta system was selected by the Department of Energy to be the first exascale supercomputer in the US.

Cloudera (-52%), an enterprise data cloud management company, announced the resignation of its CEO and reduced its full-year guidance. The merger with Hortonworks, the other major Hadoop player, has proven to be more difficult than anticipated. While the near-term outlook is challenging, we continue to believe that Cloudera's open source hybrid cloud platform for machine learning and analytics offers significant potential, and we expect sales to reaccelerate in 2020 as new products launch in Q3 and new leadership comes on board.

Nutanix (-31%), the leading provider of enterprise cloud storage solutions suitable for hybrid environments, experienced volatility in earnings in large part due to its transition to a subscription model. Software and sales solutions rose 17% YoY with stronger gross margins, but hardware revenues declined sharply. With a new sales leadership at the helm and a sharper focus on lead generation, we expect to see improvements in the next several quarters.

MOVING FORWARD

After six consecutive quarters of slowing sales and earnings growth, we believe Q2 marked the bottom in this cycle and earnings for the ROBO Index are set to increase again from Q3. Median sales growth of just 3% in Q2 compares with the high of 15% in Q4 2017 and the 10-year average of 7.5%.

While the economic outlook continued to deteriorate during the second quarter, especially in Europe, earnings per share estimates for the ROBO Index have stabilized and now stand at around +6% for 2019 and +15% for 2020, at the median, with sales growth of 5% and 8% respectively. This leaves the ROBO Index trading on a forward P/E of 22x, in line with the five-year average.

Median Forward Price/Earnings Ratio

Long Term Average = 22.1