ROBO Q4 2024 Commentary

December 31, 2024

The Robo Global Robotics and Automation Index (ROBO) returned -0.57% during the fourth quarter of 2024. Six of the eleven subsectors finished in positive territory, led by **autonomous systems** (+51.6%), **3D printing** (+10.7%), **food and agriculture** (+4.4%), and **computing & AI** (+4.1%). Lagging subsectors included **sensing** (-16.4%), **healthcare** (-3.9%), **logistics automation** (-2.7%), and **manufacturing & industrial automation** (-2.1%). Despite an overall better-than-expected quarter amid improving market conditions for 2025, **currency impact** emerged as a significant detractor, having an impact of -4.1%.

The **sensing** subsector, which includes notable companies like Samsara (a multi-year outperformer), experienced an unusual decline across all companies. This weakness stemmed from muted end-market exposure, primarily due to decreased Purchasing Managers' Index (PMI) activity. However, we anticipate a recovery, as industry geographical diversification and U.S. reshoring efforts materialize following post-election clarity.

In **actuation**, Hiwin, a leading Taiwanese motion control systems provider and long-time supplier to Boston Dynamics' humanoid and quadruped robots, continues to exemplify the subsector's potential. As discussed in previous reports, companies in this space will likely benefit from the increased development and deployment of diverse robotic forms.

Autonomous systems saw our Q2 2024 addition, EVTOL designer and developer Joby Aviation, soar 61.6%. Joby Aviation continues to hit milestones and possibly begin commercial operations in the near future. Entering 2025, we also added Serve Robotics to the subsector, which develops last-mile autonomous delivery robots.

Robotics is gaining mainstream traction, with leading technology companies increasingly focusing on physical automation as the next frontier. From fully autonomous factories and humanoid robots to drones and beyond, the industry is experiencing a renaissance driven by advances in both AI and energy technology. Global manufacturing is shifting away from China, toward India, Vietnam, Mexico, and local markets through reshoring initiatives. Looking ahead to 2025, the robotics industry is poised for further growth, supported by lower interest rates, post-election clarity in the United States, and ongoing initiatives to improve efficiencies and reduce dependencies.

We expect the most significant transformation to come from dramatic reductions in inference time and costs. This advancement becomes particularly powerful when combined with “downloadable skills.” These have been developed and refined in sophisticated simulations — effectively compressing years of learning and testing into condensed timeframes. Ultimately, we are just starting to see the potential through demos and early adoption of these newer methods.

HTEC Q4 Index Commentary

The ROBO Global Healthcare Technology and Innovation Index (HTEC) returned -2.9% during the quarter, closing the year with an annual gain of 3.5%, outperforming the MSCI World Health Care Sector, which posted returns of -10.98% for the quarter and -4.29% for the year. Four out of the nine subsectors posted positive performance.

The earnings season delivered encouraging results, with 66% of companies in the index reporting positive year-over-year EPS growth, and 84% achieving positive sales growth. These results are particularly encouraging given the expectations at the start of 2024, when the focus was on regrouping, de-risking, and laying the groundwork for accelerated growth in 2025.

This quarter brought robust performance from liquid biopsy companies (cancer detection via blood draw) and heightened volatility following the U.S. presidential election. The appointment of Robert F. Kennedy Jr. as head of the Department of Health and Human Services raised policy uncertainty, particularly for those linked to vaccine development.

Genomics led the index with an 8.9% return, driven by Guardant Health, Grail, and Natera. Guardant's colorectal screening test, Shield, was named one of TIME's Best Inventions of 2024, highlighting the transformative potential of liquid biopsy technology, a market valued at over $50 billion.

Regenerative medicine gained 8.9%, driven by Axogen's strong performance and the FDA's approval of its Avance Nerve Graft biologic license application and its expected high probability of success. Artivion sustained positive momentum, with its aortic stent grafts and On-X valve propelling global growth, supported by portfolio differentiation and positive trial outcomes. This resulted in a quarterly return of 8.9%.

Medical instruments ended the year strongly, with NovoCure achieving a Q4 return of 90.7% and a YTD return of 110.2%, driven by positive data from a pancreatic cancer study. Dexcom also showed recovery, posting a 16.0% return as it rebounded from a challenging sales force restructuring last quarter.

Precision medicine faced challenges, down 12.3%, with Regeneron underperforming despite exceeding top- and bottom-line estimates, due to concerns over Eylea HD adoption and biosimilar competition. Moderna also struggled, reflecting uncertainties regarding vaccine policies under the new administration.

Tempus IA, from the **data analytics** subsegment, experienced heightened volatility following its recent IPO and the expiration of its lock-up period, which enabled early investors to capture profits. This happened despite positive developments announced during its earnings call, including securing Medicare coverage for their cardiac dysfunction algorithms and achieving in-network provider status with Blue Cross Blue Shield of California and Illinois.

Looking ahead, annual reports are expected to provide greater clarity on 2025 forecasts. The easing of monetary policy and budgetary constraints could accelerate drug development and unlock delayed orders. While regulatory challenges in China persist, a focus on reshoring by the U.S. administration may benefit segments such as Process Automation and Medical Instruments. Current valuations (NTM EV/sales) remain below pre-pandemic lows, presenting a potentially attractive entry point amid anticipated tailwinds for 2025.

THNQ Q4 2024 Commentary

The ROBO Global THNQ Artificial Intelligence index concluded 2024 with a 5.75% return in Q4, outperforming the Vettafi Full World Index's -0.95% quarterly return. The index posted a 19.4% annual gain, though more modest compared to 2023's 57% surge.

AI's benefits are becoming increasingly tangible at both individual and societal levels, delivering enhanced value with reduced resources. Concerns about AI's energy consumption overlook both hardware advances and model efficiency improvements, as well as the substantial energy savings AI enables in sectors like residential power consumption and transportation. The horizon promises universally accessible AI assistants, precisely attuned to individual and organizational needs, goals, and constraints. Recent test results demonstrate AI's growing prowess in specialized fields like law and medicine, frequently surpassing human performance benchmarks.

Valuations saw only moderate increase in 2024, with the portfolio's weighted average forward EV/sales rising from ~7.9 times to 8.33 times — notably below 2021's peak of 14 times and current index leader NVIDIA's 25.8 times.

Performance was primarily driven by improved guidance and earnings execution. Looking ahead to 2025, we expect NVIDIA's relative outperformance to moderate given elevated expectations, while other constituents have significant upside potential against more conservative valuations.

The metrics are compelling: 95% of constituents are profitable, with 85% reporting positive year-over-year Q3 2024 EPS growth of 28.9%, and 91% showing year-over-year Q3 2024 sales growth of 18.7% (FactSet, Weighted Average).

Eight of ten subsectors delivered positive Q4 2024 performance, with healthcare and factory automation as the only laggards — though healthcare showed strong momentum in Q3. The **network & security** subsector, led by Snowflake (+44.8%), Crowdstrike (+22.0%), and Pure Storage (+22.3%), continues to strengthen as a crucial foundation for AI infrastructure. **Big data & analytics** saw strong performances from Datadog and Elastic, despite some weakness in MongoDB, positioning well for accelerated AI deployment in 2025.

Real-world implementations are accelerating, exemplified by Alphabet's Waymo division expanding autonomous vehicle operations to L.A. and Austin, with Miami and Japan on the horizon. Multi-modal AI has arrived, integrating text, vision, and audio processing with enhanced physical world understanding, which will push consumer-grade AI to become more mainstream, something we are anticipating from META's innovations in augmented reality and human-computer interaction (e.g. wrist motor sensors).

In the **semiconductor** sector, Ambarella led with a 29% stock gain, outpacing NVIDIA's 10.6%, highlighting the growing importance of edge computing and embodied AI for real-world applications. Notable developments included AI chip announcements from Amazon (Trainium) and Microsoft (MAIA), plus TSMC's launch of advanced nodes at Arizona's Fab 21 plant and their progress on silicon photonics for networking, pointing to future energy and performance gains. Looking ahead, this expansion will drive demand for more scalable networks, enhanced cybersecurity, and edge solutions, like recently added Raspberry Pi, while locally-running AI models on consumer hardware become mainstream.

Looking ahead, 2025 stands as a pivotal inflection point in technological advancement. While superhuman AI capabilities are already emerging in specific domains, they're rapidly being refined into practical, reliable tools and autonomous systems. With global connectivity reaching new heights and AI developing deep contextual understanding of human knowledge, we expect continued transformation across industries. Current valuations suggest significant upside potential as these technological advances translate into tangible business outcomes and societal benefits.

About VettaFi

VettaFi is a provider of indexing, data & analytics, industry leading conferences, and digital distribution services to ETF issuers and fund managers. It operates the ETFdb, Advisor Perspectives, and ETF Trends websites and the LOGICLY portfolio analytics platform—engaging millions of investors annually— empowering and educating the modern financial advisor and institutional investor. VettaFi owns and administers the ROBO Global Index Series. For more information, please visit: www.vettafi.com.

VettaFi LLC, is a wholly owned subsidiary of TMX Group Limited (TMX Group). For more information about TMX Group, please visit: www.tmx.com.

vettafi.com | 1330 Avenue of the Americas, New York, NY 10019

VettaFi Disclaimer

This Document Is Impersonal and Not a Solicitation. ROBO Global, LLC is a wholly owned subsidiary of VettaFi LLC. VettaFi LLC, collectively with its affiliates and subsidiaries, is referred to herein as ("VettaFi"). This document does not constitute an offering of any security, product, or service. All information provided by VettaFi in this document is impersonal and not customized to the specific needs of any entity, person, or group of persons.

About the Indexes. The Robo Global Robotics and Automation Index™ (the "Index") seeks to track the combined performance of a basket of global stocks that identify eleven (11) subsectors of suitable product and technology maturity to the robotics and automation theme. These subsectors carry high growth and earnings potential and are regularly screened to identify companies that are publicly traded, meet a minimum robotics revenue threshold, are positioned as technology and growth leaders, and satisfy our ESG Policy. The ROBO Global® Healthcare Technology and Innovation Index Series' objective is to provide investors with comprehensive, transparent and diversified benchmarks representing the global value chain of disruptive and emerging technologies in the healthcare sector. The index series benchmark companies that have a distinct portion of their business and revenue derived from the field of healthcare technologies, and the potential to grow within this space through innovation and/or market adoption of their products and/or services. The ROBO Global® Artificial Intelligence Index Series' objective is to provide investors with comprehensive, transparent and diversified benchmarks representing the global value chain of Artificial Intelligence technologies. The index series benchmark companies that have a distinct portion of their business and revenue derived from the field of Artificial Intelligence, and the potential to grow within this space through innovation and/or market adoption of their products and/or services. The Index and its trademarked name are the exclusive property of VettaFi.

No Advisory Relationship. VettaFi is not a fiduciary or an investment advisor, and VettaFi makes no representation regarding the advisability of investing in any investment fund or other VettaFi does not assume any obligation to update the Content following publication in any form or format.

vehicle. This document should not be construed to provide advice of any kind, including, but not limited to, investment, tax or legal.

You Must Make Your Own Investment Decision. It is not possible to invest directly in an index. Exposure to an asset class represented by an index is available through investable instruments based on that index. You should not make a decision to invest in any investment fund or other vehicle based on the statements set forth in this document. You should only make an investment in an investment fund or other vehicle after carefully evaluating the risks associated with such an investment in the investment fund, as detailed in the offering memorandum or similar document prepared by or on behalf of the issuer. This document does not contain, and does not purport to contain, the level of detail necessary to give sufficient basis to an investment decision. VettaFi does not sponsor, endorse, sell, promote, or manage any investment fund or other investment vehicle that is offered by third parties and that seeks to provide an investment return based on the performance of any index.

No Warranties; Limitation of Liability. While VettaFi believes that the information contained in this document (collectively, the "Content") is reliable, VettaFi does not guarantee the accuracy, completeness, timeliness, or availability of the Content in whole or in part. VettaFi is not responsible for any errors or omissions, regardless of the cause, in the Content which may change without notice. VettaFi makes no warranties, express or implied, as to results to be obtained from use of the Content, and VettaFi expressly disclaims all warranties of suitability with respect thereto. VettaFi shall not be liable for any claims or losses of any nature in connection with the use of the Content, including but not limited to, lost profits or punitive or consequential damages, even if VettaFi has been advised of the possibility of same.

Research May Not Be Current. This document has been prepared solely for informational purposes based on information generally available to the public from sources believed to be reliable.