

Latest Changes to the PHLX Semiconductor™ Index (SOX™)

David Tsoi, CFA, CAIA, FRM, CESGA, CAMS, Senior Product Development Specialist, *Nasdaq Index Research*

Launched in 1993, the PHLX Semiconductor™ Index (SOX™) aims to measure the performance of companies primarily involved in the design, distribution, manufacture, and sale of semiconductors. As a leading benchmark for the semiconductor industry, SOX serves as the tracking index for many investable products globally.

Index Methodology Update

As part of an ongoing effort to preserve the future replicability and integrity of its indexes, Nasdaq sought feedback from investors, clients, and other industry professionals regarding the advisability of changes to the SOX index methodology in March 2024.¹ Having taken the responses to the consultation from stakeholders into consideration, Nasdaq has implemented the following changes, effective on April 22, 2024:²

Constituent weighting process

Initial weights of constituents are determined by dividing each constituent's market capitalization by the aggregate market capitalization of all constituents. Initial weights are then adjusted to meet weight constraints.

Previous methodology	Updated methodology
The individual weights of the top five constituents by market capitalization are capped at 8% each. The individual weights of other constituents are capped at 4% each.	The individual weights of the top three constituents by market capitalization are capped at 12%, 10% and 8%, respectively. The individual weights of other constituents are capped at 4% each.

Should any constituent's weight exceed its respective constraint, the excess weight is proportionally redistributed to the constituents with lower weights by market capitalization. Such redistribution is done iteratively until all constituents are at or below their respective constraints.³

Index share adjustments

Previous methodology	Updated methodology
If the change in total shares outstanding (TSO) arising from other corporate events ⁴ is greater than or equal to 10%, the change is made as soon as practicable. If the change in TSO is less than 10%, all changes are accumulated and made effective at one time quarterly after the close of trading on the third Friday in each of March, June, September and December.	Other than as a direct result of corporate actions, the index does not normally experience share adjustments between scheduled index rebalance and reconstitution events.

¹ https://indexes.nasdaqomx.com/docs/SOX_Consultation_March_2024.pdf

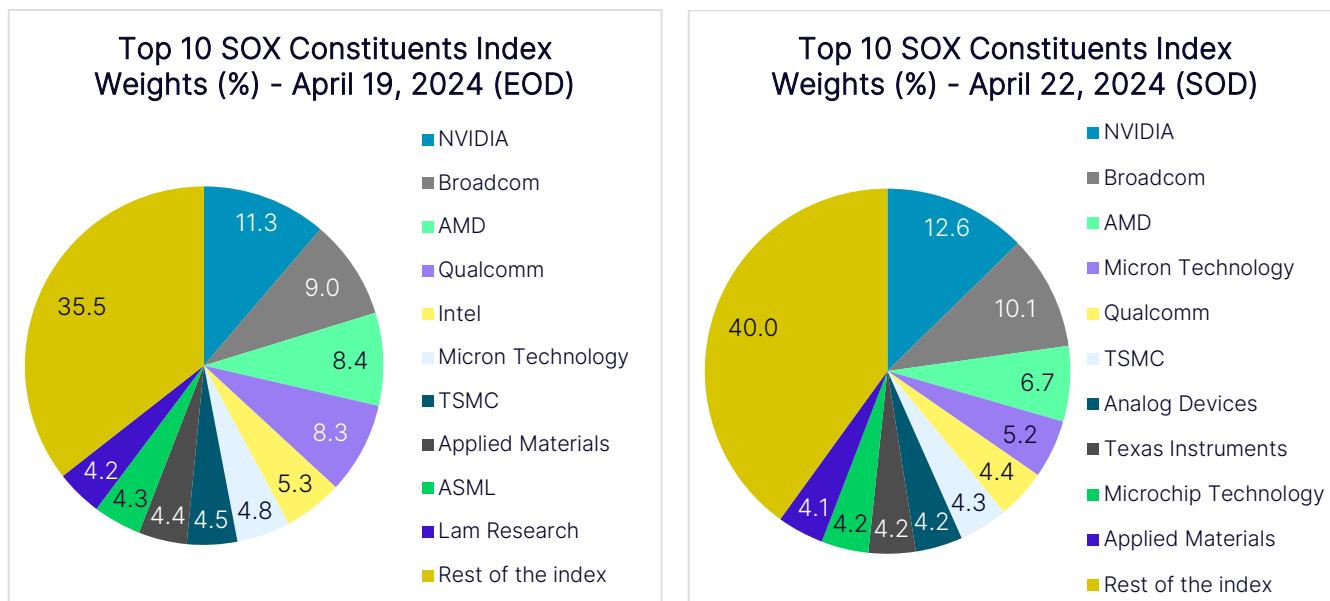
² <https://indexes.nasdaqomx.com/docs/SOX%20Consultation%20Summary%20and%20Conclusion.pdf>

³ For further information about index weighting, please refer to Nasdaq Index Weight Calculations guide.

⁴ As defined in Nasdaq Corporate Actions and Events Manual – Equities

Impact of the Revised Methodology

The adjustments in weight caps reflect the current state of the semiconductor industry more adequately. The weights of the top 10 constituents of SOX before and after the adjustments are shown below. As of April 22, 2024 (start of day), the ten largest constituents accounted for 60.0% of the index weight.



Source: Nasdaq Global Indexes. As of April 22, 2024.

Updates on SOX Key Constituents

NVIDIA's valuation passed the \$2 trillion threshold for the first time in February 2024⁵, after becoming the fifth publicly traded US company to join the trillion-dollar club in May 2023.⁶ As the undisputed leader in designing semiconductors for artificial intelligence (AI) applications, the introduction of its newest graphics processing unit (GPU) platform "Blackwell" may help extend the firm's technology leadership advantage for years to come. The B200 GPU shows strong performance gains over the prior generation H100, with 2.5 times training improvement and 5 times inference improvement. While the new products will be available later this year, NVIDIA expects Blackwell to be adopted by the world's major technology firms, including Amazon, Google, Meta, Microsoft, OpenAI, and Oracle.⁷ Although its share price rose 173% during the last 12 months ending April 19, 2024, its forward P/E ratio tumbled to 31x, compared to 47x one year ago.⁸

As a technology infrastructure powerhouse with unmatched technology capabilities and scale in the industry, Broadcom is the ninth-largest US company and its shares had a one-year total return of 94%.⁹ While NVIDIA's GPUs have undeniably dominated the AI gold rush since 2023, Broadcom is poised to seize a significant share of the forthcoming wave, particularly in the realms of networking and application-specific integrated circuits (ASICs). The firm's growth in the semiconductor segment is mainly driven by strong demand for its networking products in AI data centers, as well as custom AI accelerators from hyperscalers. Over the past five years, Broadcom has established itself as a leader in ASIC development, particularly in collaboration with tech giants like Google and Meta. JPMorgan estimates that Google and Meta combined will drive over \$9 billion in AI ASIC chip revenues for Broadcom this year, a significant increase from \$3.5 billion last year.

⁵ <https://www.reuters.com/technology/nvidia-hits-2-trillion-valuation-ai-frenzy-grips-wall-street-2024-02-23/>

⁶ <https://www.reuters.com/technology/nvidia-sets-eye-1-trillion-market-value-2023-05-30/>

⁷ <https://nvidianews.nvidia.com/news/nvidia-blackwell-platform-arrives-to-power-a-new-era-of-computing>

⁸ Bloomberg. As of April 19, 2024.

⁹ Bloomberg. As of April 19, 2024.

As the AI chip market is projected to reach \$400 billion per year by 2027¹⁰, the market will likely grow big enough for AMD to carve out a meaningful share for itself. As NVIDIA itself has said it cannot meet all the demand for AI chips, an opportunity for AMD and others to gain market share exists. AI chip customers appreciate the presence of a strong number two in the market to keep prices down and spur innovation. Microsoft, Meta, Oracle, and other cloud providers have announced their adoption of AMD's Instinct MI300X chip. With a one-year total return of 63%¹¹, the chip designer has recently introduced a new series of semiconductors tailored for AI-enabled business laptops and desktops¹² as the firm aims to expand its share of the lucrative AI PC market. AI-enabled PCs refer to machines with advanced chips capable of running large language models and applications powered by AI directly on the device, instead of in the cloud. Gartner projects shipments of AI PCs to represent 22% of all PCs this year.¹³

Micron Technology is poised to receive \$6.1 billion in grants from the US Department of Commerce to help build two megafabs in New York and one in Idaho.¹⁴ As the largest US maker of memory chips, Micron delivered a total return of 77% in the past 12 months.¹⁵ The growing adoption of AI indicates remarkable growth prospects for the high bandwidth memory (HBM) market. Mizuho Securities expects the HBM market to grow at a three-year compound annual growth rate of 65% to reach \$17.5 billion by 2026. Micron has started mass production of its HBM semiconductors and expects "several hundred million" dollars of revenue will be generated from these products in fiscal 2024. While its HBM is sold out for 2024, the majority of its 2025 supply has already been allocated. The firm also noted that its HBM3E product, which consumes 30% less power than its competitors' offerings, will be used by NVIDIA's H200 Tensor Core GPUs.¹⁶

Conclusion

The semiconductor industry has evolved considerably since the the launch of the SOX in 1993. The index methodology was thus due for a refresh following a comprehensive assessment of feedback provided by its stakeholders. While the weight caps of the three largest constituents have been adjusted to 12%, 10% and 8%, respectively, the individual weights of other constituents will continue to be capped at 4% during each quarterly rebalance.

Funds tracking SOX include the Invesco PHLX Semiconductor ETF (Nasdaq: SOXQ), the Mirae Asset TIGER US PHLX Semiconductor Sector Nasdaq ETF (South Korea: 381180), the Cathay PHLX Semiconductor ETF (Taiwan: 00830), and the Global X Semiconductor ETF (Japan: 2243). The Mirae Asset TIGER Synth-US PHLX Semiconductor Sector Leverage ETF (South Korea: 423920) tracks SOX with two times leverage.

¹⁰ <https://www.reuters.com/technology/amd-forecasts-45-billion-ai-chip-market-this-year-2023-12-06/>

¹¹ Bloomberg. As of April 19, 2024.

¹² <https://ir.amd.com/news-events/press-releases/detail/1190/amd-expands-commercial-ai-pc-portfolio-to-deliver>

¹³ <https://www.gartner.com/en/newsroom/press-releases/2024-02-07-gartner-predicts-worldwide-shipments-of-ai-pcs-and-genai-smartphones-to-total-295-million-units-in-2024>

¹⁴ <https://www.whitehouse.gov/briefing-room/statements-releases/2024/04/25/fact-sheet-president-biden-announces-up-to-6-1-billion-preliminary-agreement-with-micron-under-the-chips-and-science-act/>

¹⁵ Bloomberg. As of April 19, 2024.

¹⁶ <https://investors.micron.com/static-files/c531bd08-22cd-4d6b-9540-f8aa72459716>

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