

SEMICONDUCTOR INDUSTRY REVIEW & OUTLOOK

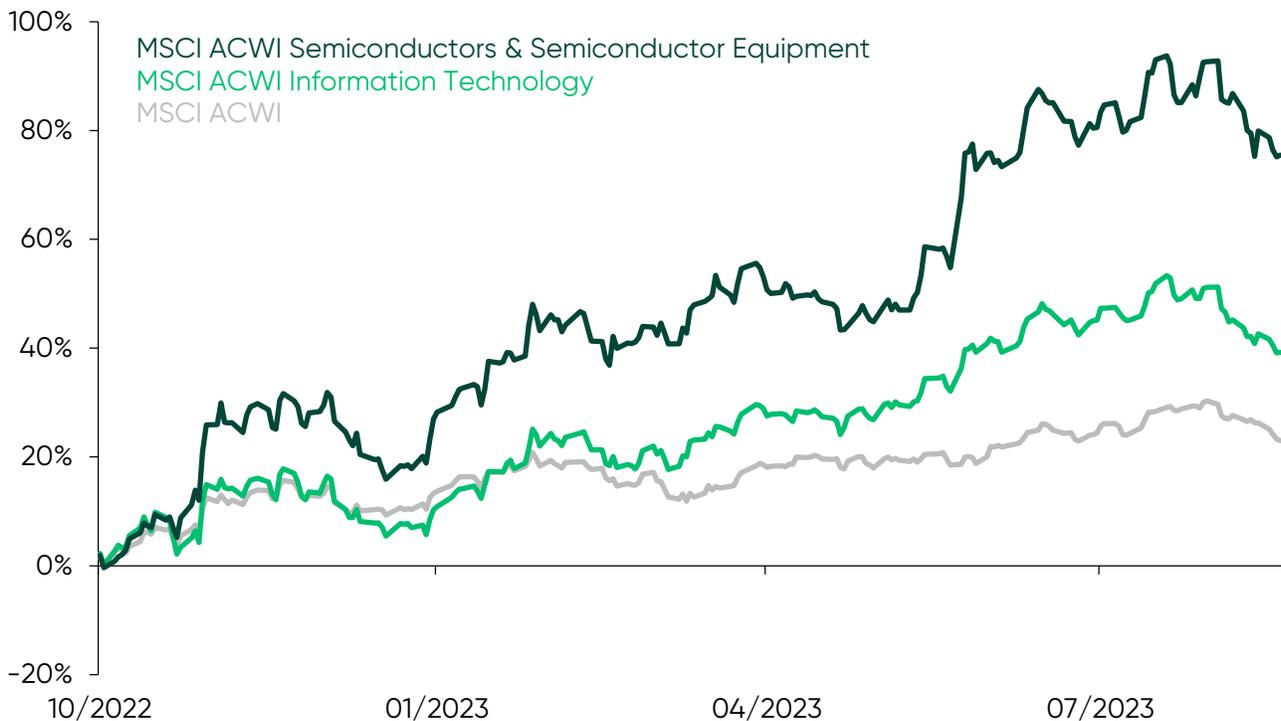
SEPTEMBER 2023

OVERALL INDUSTRY ANALYSIS

Semiconductor companies were generally hit hard during last year's bear market but have bounced strongly since this bull market began in October 2022—as we would expect in a nascent market recovery (Exhibit 1). Beyond this “bounce effect,” the semiconductor industry is anticipating a strong recovery coming out of the semiconductor downcycle as well as excitement around artificial intelligence (AI), which spurred demand for chips.

Furthermore, we see secular growth drivers in areas exposed to artificial intelligence, mobile computing, cloud computing (data centres), Internet of Things (i.e. auto, industrial, medical, infrastructure testing and management), and next generation semiconductor equipment. These growth drivers are further strengthened in the US where the CHIPS and Science act directs \$280 billion in US semiconductor spending—including subsidies, research and development and 25% investment tax credit for manufacturing equipment.¹ However, we remain wary of semiconductor firms levered to traditional PCs, TVs, solar, and basic consumer electronics as the group is traditionally economically sensitive and maintains relatively lower margins given the increasingly commoditised nature of those businesses. The industry's economic sensitivity has lessened in recent years as the end markets for semiconductors diversified beyond pure electronic or technological applications.

Exhibit 1: Semiconductor Outperformance Since World Bear Market Trough



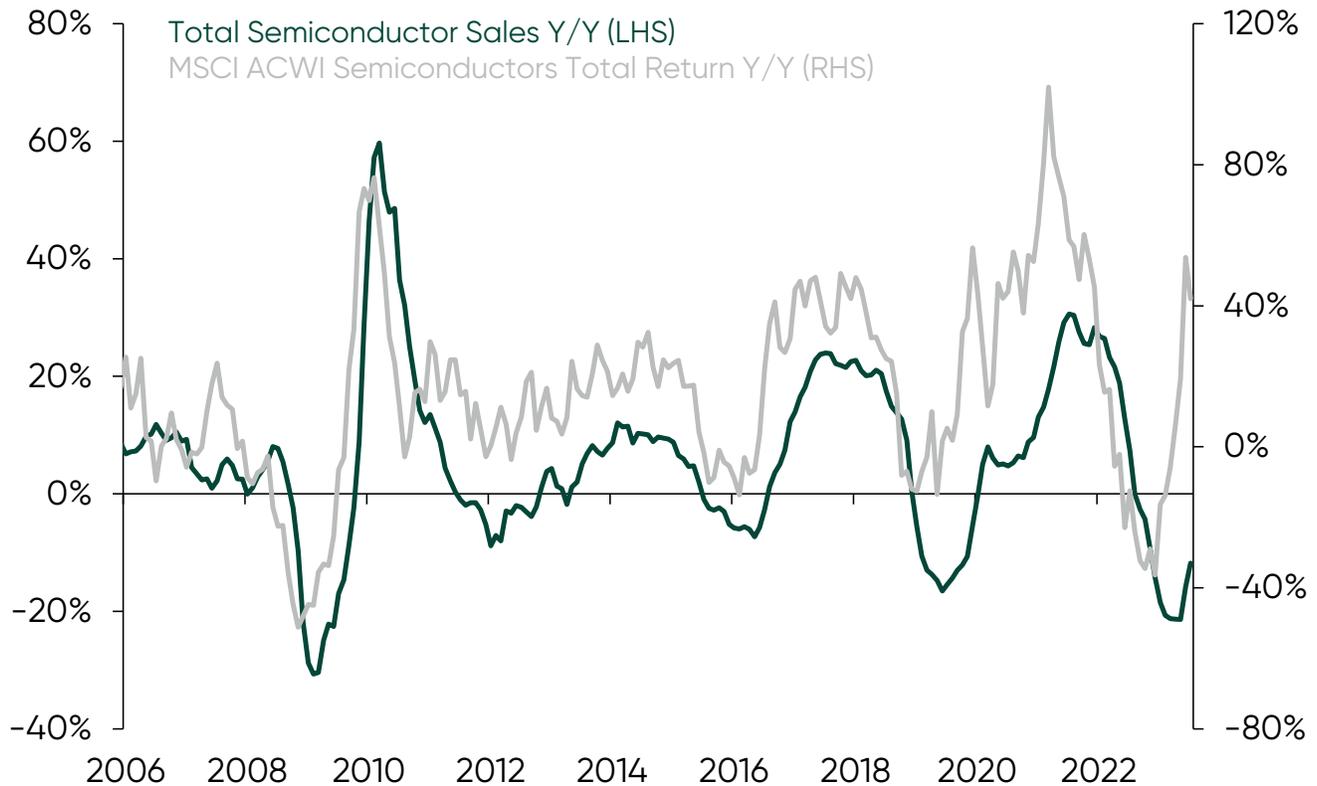
Source: Factset. Daily data from 13/10/2022 - 31/08/2023. USD.

Looking forward, growing demand for products and services related to mobile devices, cloud computing and AI should drive better-than-feared softening in global Information Technology spending.

SEMICONDUCTOR CYCLE UPDATE

The start of the new semiconductor upcycle should support continued outperformance moving forward. Recent data shows semiconductor sales bottomed in May and inflected in June (Exhibit 2). Unless semiconductor sales contract again, this suggests the semiconductor downcycle (defined as 'peak to trough' in global semiconductor sales growth y/y), is likely nearing its end and recent strong performance in semiconductors should continue over the coming 12-18 months, in our view.

Exhibit 2: Semiconductor Fundamentals Recently Bottomed



Source: Semiconductor Industry Association. Semiconductor total sales data as of 30/06/2023.

The shift from the semiconductor downcycle to upcycle generally follows three phases detailed below. The first 2 phases look to be complete with phase 3 now expected sometime in the next 12 months.

- **Capex Reduction:** We have already seen numerous capex cuts from equipment and Integrated Device Manufacturer (IDM) companies. For example, Samsung announced more cuts from NAND production recently.ⁱⁱ
- **Peak Inventory:** While inventory corrections are still occurring, most companies already experienced peak inventories in Q1 and Q2. Inventory levels should be improving going forward.
- **Price Inflection:** We haven't seen any significant improvements to pricing yet (apart from leading-edge AI chips), but we believe this likely happens sometime in the 2nd half of 2023.

SEMICONDUCTORS AND CHINA RESTRICTIONS

Global competition between the US and China continues to have downstream impacts on the Information Technology sector. We expect increased trade barriers and export restrictions to lead to the diversification of supply chains in semiconductors and other strategic industries over time. This may increase protectionist spending that favours domestic suppliers at the expense of multinational tech firms and dependent supply chain exposed tech firms.

In restricting exports, the US is attempting to stifle Chinese advancement within semiconductors, most recently with the Chips Alliance with Japan and the Netherlands. The goal is to decrease reliance on China, strengthen relationships with US allies and gain more market share from Chinese manufacturers.

Specifically, despite the export ban to China, NVIDIA has beat expectation for revenue growth led by its data centre segment with strong demand from hyperscale and demand for AI chips in particular. Decline from export ban restrictions were largely offset by alternative product sales into China. For example, NVIDIA started to produce A800 chips shortly after the announcement as an alternative to the restricted A100 GPU chips to sell in China.ⁱⁱⁱ The A800 chip bypasses the US government restrictions, although the chip may get restricted upon further bans. Furthermore, ASML believes the impacts from the export ban to China should be limited. After the Dutch Prime Minister visited Washington, no changes have been announced, as of late June 2023. For context, shipping EUV (the most advanced equipment necessary for making leading edge chips) to China has been restricted since 2019 following the US/Dutch government diplomatic impacts and that did not have a material impact on ASML.

Rumours have also begun circling that the US has decided to extend exemptions to its semiconductor export restrictions for Korean and Taiwanese chipmakers by one additional year. The export ban was meant to begin in October 2023. This means Korean and Taiwanese chipmakers will continue to be able to manufacture advanced semiconductors in their Chinese fabs. This is further evidence of US chip export restrictions being 'better than feared', similar to past cases where licences were granted for the export of GPUs to China. Future changes in policy likely hinge on the evolving US-China relationship. However, it is important to note that these restrictions remain powerful if and when the US wants to fully implement them.

CONCLUSION

While economic and political fundamentals are mixed in the semiconductor industry today, including high inventories, relatively weak pricing and ever-changing geopolitical conditions, on a forward-looking basis the industry outlook is improving and equities are performing as expected—with equity prices advancing in anticipation of a fundamental rebound.

ⁱ Source: "The CHIPS and Science Act: Here's what's in it," McKinsey & Company, October 2022.

ⁱⁱ Source: Factset. As of April 2023.

ⁱⁱⁱ Source: Factset, As of June 2023.

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