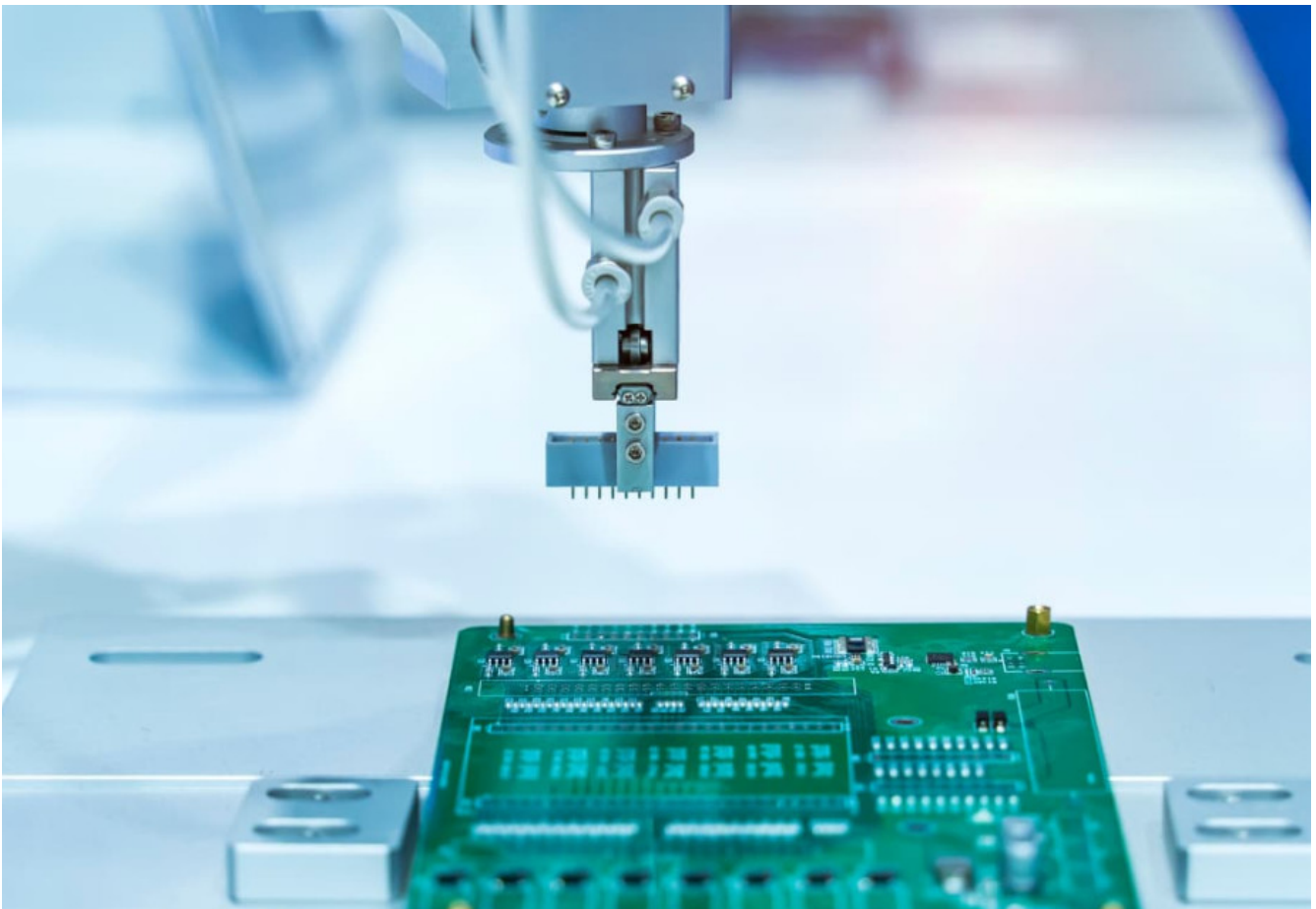


# SEMICONDUCTORS SECTOR: GEOPOLITICAL AND CLIMATE CHANGE- RELATED RISKS AT THE HEART OF THE SEMICONDUCTORS SECTOR OUTLOOK



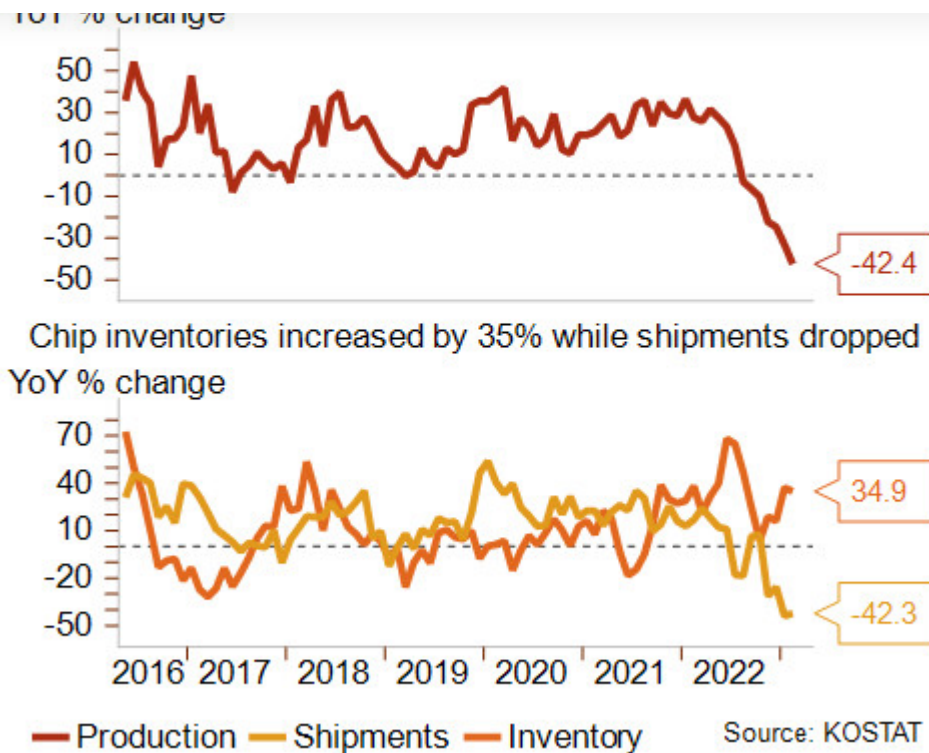
## SHARE ARTICLE

While having been in the news during the pandemic because of shortages that were hurting supply chains in many client industries worldwide, the semiconductors sector is now facing a rapid decline due to slowing demand for consumer electronics. However, the unprecedented shortages seen in the industry in the last two years, have highlighted the importance of those components in our modern, interconnected and digitised life, and many countries want to gain sovereignty in their production.

### Short-term downturn is worsened by a drop in demand for consumer electronics

After a boom and a subsequent global shortage during the pandemic, demand for semiconductors for traditional consumer electronics such as computers, smartphones, gaming tools, etc. has been on the decline recently due to the ongoing consumer confidence crisis and slowdown of the economic activity. What is more, manufacturers of ICT electronics had increased stocks of chips on the back of the supply chain issues until last summer, leaving them well supplied. Sales in memory chips by Samsung, one of the leaders in the segment, registered a correction in Q4 2022. The drop is expected to continue in Q1 2023. As a result, global production adjusted and big producing countries like South Korea have seen their production falling (see graph below). According to World Semiconductor Trade Statistics (WSTS), the global semiconductor market is projected to decline by 4.1% in 2023, driven by the memory segment. The sector's capital expenditures (CapEx) are expected to take a severe blow this year as a result. On the other hand, we continue to observe shortages of semiconductors for industrial and automotive use. However, they account for a much smaller market than computers, mobiles and consumer electronics.

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## Geographical concentration is posing a geopolitical risk

The sector is very concentrated. In 2020, 73% of all chip manufacturing was done in four East Asian countries (China, Japan, South Korea and Taiwan), headed by Taiwan. Taiwan itself represents about 90% of the global production of the most advanced chips. This geographical concentration in production poses diverse supply risks, mainly stemming from geopolitical and climate change-related factors.

Geopolitical tensions are indeed concentrating around this sector since, in addition to being key to modern day-to-day life, chips are also critical for the acceleration of the green transition and in the development of military capacities.

The US-China trade war notably intensified once more last October, when the USA imposed tough export control regulations aimed at hampering the development of almost every aspect of the Chinese semiconductor industry. These rules not only prevent US makers of chip tools from exporting to China, but they also prohibit companies from third countries from using US-made equipment to serve Chinese customers in certain circumstances without the USA's approval. In addition, the US Department of Commerce announced a new rule under the Chips and Science Act, which foresees a basket of USD 56 billion in funding for the chipmaking industry, banning US semiconductor companies that would receive subsidies from expanding their capacity in China for ten years.

This implies mounting difficulties for the Chinese chipmaking industry. Companies such as Semiconductor Manufacturing International Corporation (SMIC) or Yangtze Memory Technologies (YMTC) have seen their possibilities of obtaining any equipment, services, and



But these developments also impact third-country chipmakers previously using US equipment, who will lose parts of their export market in China, or those present in both China and the USA and candidate for benefitting from the US subsidy industrial scheme. Even though they received a one-year waiver expiring next October, allowing them to continue to export to China, Taiwanese TSMC (Taiwan Semiconductor Manufacturing Company Limited) and South Korean Samsung will have to make up their minds as they are both eligible for funding for the construction of new chips megafabs in the USA.

The Taiwanese sector – in addition to those indirect impacts from the US sanctions against China – is likely to suffer from the USA's intention to become less dependent on Taiwan, and would be more directly exposed and a target of (physical or more regular cyber) attacks in case of a deterioration of tensions with China.

In the USA, the industry is obviously expected to benefit from those developments in the long run. The combination of external sanctions and domestic subsidies should lead to increased investment in domestic production and in research and development. The progressive decrease of Chinese companies in the market should allow US companies to gain more market share.

Another potential winner of the US-China trade war is Malaysia, which already has a robust semiconductor industry and is well positioned in the middle of the US-China geopolitical tensions to benefit from them. It has already taken advantage of the situation as US companies are relocating their manufacturing facilities away from mainland China.

## Becoming independent in chip production is the new quest

Not only in the USA, but all around the world, governments are boosting their semiconductor industries. In Asia, major producing countries like Japan, India or South Korea, are also pumping money into their national industries. South Korea announced a ten-year USD-450-billion investment to strengthen its semiconductor industry.

Demand for semiconductors is estimated to double between 2022 and 2030, according to the responses from European industry professionals in a survey launched by the European Commission. Europe currently accounts for less than 10% of the global production but is trying to catch up and claim a share of the growing cake. The EU Chips Act, first proposed early last year, is under negotiation and is likely to be finalised in the second half of 2023. Once implemented, it should introduce shortened administrative procedures and direct European public funds towards the semiconductor sector. The initial goal was to mobilise EUR 43 billion of public and private investments for the semiconductor industry by 2030, among which about 25% of public funding from the EU and member states.

More international cooperation is also being sought. In 2021, the EU and the USA saw opportunities in mutually beneficial cooperation, which has led to the launch of the EU-US Trade and Technology Council (TTC), where both parties expressed a commitment to: "... building a partnership on the rebalancing of global supply chains in semiconductors with a view to enhancing respective security of supply as well as their respective capacity to design and produce semiconductors, especially, but not limited to, those with leading-edge



fulfilling its part of the trilateral agreement with the USA and the Netherlands from the beginning of 2023.

On the other hand, the US sanctioning scheme towards China also influences sales of European players in the sector, as illustrated by the Dutch authorities recently having imposed new export controls on advanced machines to print microchips. This will deal a blow to ASML, the global leader in the production of advanced microchip printing machines. China accounts for about 15% of the ASML's order backlog. A reorientation of the markets will therefore be needed.

## Water-intensive nature of this industry exposes it to climate change-related risk

Besides geopolitical risks, the increased frequency of climate change-related events, such as extreme droughts or major floodings, is posing a severe risk to the supply of such components due to the geographical concentration of their production and the water-dependent nature of production processes. TSMC reports consuming 99,000 tons of water per day and water needs increase with the more advanced production techniques. Disruptions to global supplies were observed two years ago, when Taiwan was hit by its worst drought in a century. Signs of drought are visible again this season, which could affect current production.

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4/04/2023

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