

Battle of Semiconductors: How China's Push for Self-sufficiency is Reshaping Global Semiconductor Supply Chain

EXECUTIVE SUMMARY

- **The world is in the grip of semiconductor (also called chip) shortages because demand far outstrips supply.** Global chip demand has increased eightfold every year for the past decade, and total annual demand worldwide now exceeds US\$500 billion¹. Shortages are mainly caused by the following factors:
 - The COVID-19 pandemic notably lifts demand for semiconductors, which have become an integral part of our daily lives, because people snapped up game consoles, laptops, TVs, to get through lockdowns and a host of communication devices to keep contacts with friends and family members as well as colleagues and clients, as many of them have to stay or work at home;
 - Business model shifting in the semiconductor industry to contract production to third parties has also created a supply bottleneck at outsourced chip factories (commonly known as foundries); and
 - U.S. sanctions have caused panic stockpiling by semiconductor companies around the world not just those vulnerable to the move on fears of not having enough parts. Such stockpiling activities only make the situation worse.
- **End of shortages are not yet in sights,** as delivery times (the time interval between a semiconductor is ordered and it is delivered) for chips lengthened in December 2021 for the second month in a row, increasing six days over November to about 25.8 weeks². A more muted increase in October had spurred speculation that chip supply constraints were improving.
- **Semiconductors are the lifeblood of many industries.** They rank the world's fourth-most traded products, counting both imports and exports, only after crude oil, refined oil and cars. **Widespread semiconductor shortages are crippling players in diverse applications,** shutting down many automobile production lines in many parts of the globe mostly temporarily and restraining output of consumer electronics. According to executives of several industry bellwethers, including Intel (INTC US), **it could take several years to fully resolve this issue**³ though ongoing incremental improvements in semiconductor supply are expected.
- Semiconductors are highly complex products in terms of design and manufacturing. The industry needs **enormous investments, a sophisticated global supply chain, and a research infrastructure** integrated by specialized companies and technology-intensive institutions across the globe. Chip manufacturing involves very advanced processes and hundreds of companies with expertise in various crafts, and **no country could do it all independently.** Although Chinese technology giants, including Alibaba (BABA US, 9988.HK) and Baidu (BIDU US, 9888.HK) have been able to design their own chips in recent years, China is **trying to bring home leading-edge chip design and manufacturing as well as other highest value-added technologies.**

¹ The U.S. Information Technology Office

² Bloomberg citing Susquehanna Financial Group, 4 January 2022

³ Intel Corporation

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