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COMMENTARY
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Why Chipmakers Are in No Rush to Leave Asia

Chip factories under construction worldwide are an effort to diversify.

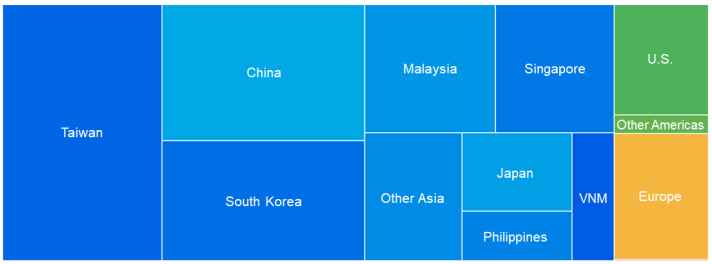
- Asia dominates global electronics production, particularly in semiconductors, with Taiwan and South Korea leading in advanced chip manufacturing. The U.S. and Europe rank far behind.
- Regional concentration has enabled substantial economies of scale but has become a point of concern in an era of increased geopolitical tension.
- Governments, aiming to bolster chip production and protect strategic technologies, are offering subsidies to attract leading chipmakers to their shores.
- New chipmaking factories under construction across the globe will make chip supply more resilient to shocks but don't point to a wholesale departure from Asia.
- New investment appears to be shifting away from China, but chip and electronics production will stay in Asia for the foreseeable future.

In the 1990 film *Back to the Future III*, protagonist Marty McFly finds himself stranded in 1955, trying to repair his time-travelling vehicle, a DMC DeLorean, so he can return to 1985. Pulling a malfunctioning circuit from the car, his companion, the 1955-native Emmett "Doc" Brown, remarks, "No wonder this circuit failed, it says 'Made in Japan'." Marty's response: "What do you mean Doc? All the best stuff is made in Japan." A stunned Doc mutters, "Unbelievable."

It's difficult to imagine now, but U.S. and European corporations used to dominate global electronics. Throughout much of the 20th century, the West pioneered new technologies and produced the world's most advanced chips. But by the 1990s, things had changed. Japanese producers had risen to prominence in the semiconductor market, making chips that were more powerful and cheaper than those out of the U.S. and Europe. Fast-forward 30 years, and virtually all the world's advanced chip production happens in Taiwan and South Korea, while the U.S. and Europe each produce less than 10% of the global chip supply.

Asia Is the Biggest Supplier of Chips

Exports of electronic integrated circuits by country, 2019-2021 avg, $823.6 bil total



Sources: Atlas of Economic Complexity, Moody's Analytics

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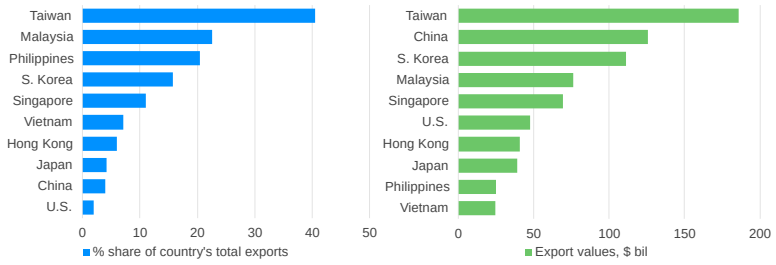
Asia's leadership in chips has had certain advantages. Centralising chip production among a few large companies has led to enormous economies of scale and created a regional supply chain that caters to the industry's needs. Whereas Taiwanese and South Korean tech giants such as Taiwan Semiconductor Manufacturing Co. or Samsung Electronics Co. specialise in high-end semiconductors, manufacturers in Southeast Asia supply legacy chips—less advanced but highly efficient chips used in cars through to consumer appliances and defence equipment. Japanese companies tend to specialise in providing materials and equipment such as specialised chemicals and machinery used in the production of semiconductors.

But Asia's tech dominance also has downsides. Electronics play such an outsize role in Taiwan's economy that its trade and output figures overlap nearly perfectly with the ups and downs of global semiconductor billings. When chips do well, so does the Taiwanese economy; but when chips do poorly, so too does the Taiwanese economy. Surging demand for global electronics meant Taiwan was one of the only economies in the world to avoid a recession during the COVID-19 pandemic. But when electronics demand slumped after the pandemic, so did the fortunes of Taiwan's tech giants. Its economy weakened and wage growth slipped behind the rate of inflation—a key issue in Taiwan's recent presidential election.

Chips Play an Outsize Role in Taiwan's Economy

Exports of electronic integrated circuits, 2019-2021 avg, % share of total (L), export values (R)



Sources: Atlas of Economic Complexity, Moody's Analytics

Foreign governments are also increasingly uneasy about industry concentration. The risks associated with having most of the world's leading-edge chips made in an economy lacking clear international status (Taiwan is viewed as a breakaway province by the People's Republic of China) is not lost on policymakers abroad. Indeed, this is why many governments have in recent years sought to reshore chip production and safeguard key technologies against Chinese influence. Governments in the U.S., Europe and Japan plan to increase their share of global chip production and are offering substantial subsidies to lure chipmakers to their shores. The U.S. has also worked with the Netherlands and Japan to restrict exports to China of chipmaking tools such as lithography machines made by the Dutch firm ASML Holding N.V. Pandemic-era chip shortages and China's ambitions to expand homegrown semiconductor production have added urgency to these efforts.

But manufacturers seem in no rush to return to Western shores. Analysis of the Orbis Crossborder Investment database, which tracks company-reported gross foreign direct investment, shows a decline in the number of electronics-related investment projects completed over the last three years compared with the three years before the pandemic. But capital expenditure involved has jumped during the same period. The results vary by economy. For ASEAN economies, especially Vietnam, Malaysia, and Singapore, the number of projects and the capex value have increased. The opposite is the case in China. Data for the U.S. and Western Europe are more ambiguous—project count has declined, but capex amounts have increased.

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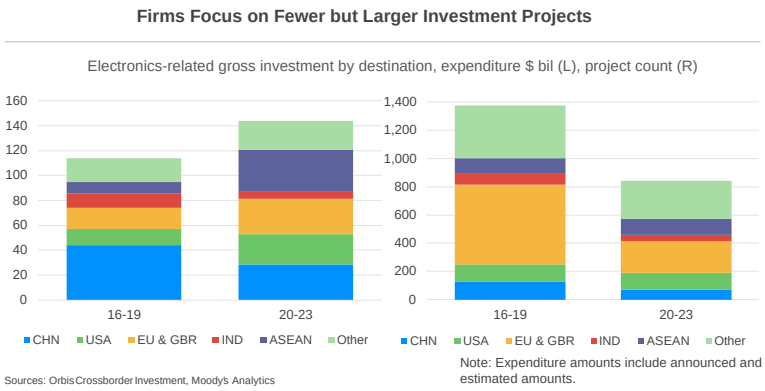
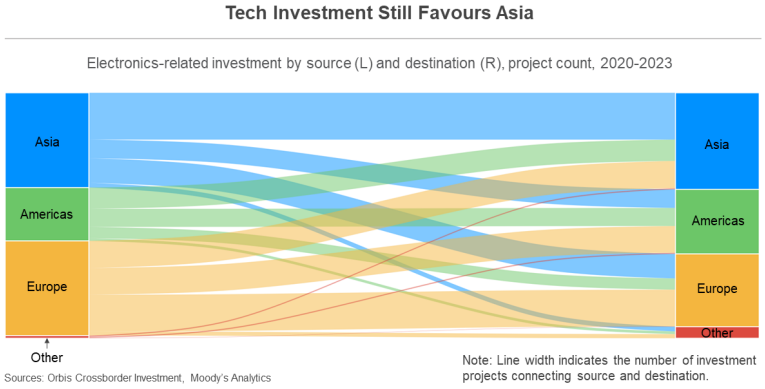


Looking at investment flows by source and destination across regions, investment is still mostly flowing into Asia. Although the number of completed projects in the Americas has increased, not all investment has been directed to the U.S.; some has headed to neighbouring economies, including Mexico. Europe is a major source of foreign investment but receives a modest share of global flows.



Indeed, the broader data do not point to a wholesale departure from Asia. Much of the investment heading to the U.S. and Europe is aimed at establishing chipmaking factories, or "fabs", for producing legacy chips rather than cutting-edge designs. GlobalFoundries Inc., a chipmaker spun out of Advanced Micro Devices Inc. (better known as AMD) in 2009, is one such example. Its planned expansion of a facility in New York state will primarily focus on chips used in automobiles and consumer electronics. Similarly, TSMC is constructing a fab in Germany that will specialise in legacy designs. Although such facilities should make U.S. and European supply chains more resilient against shocks, they won't transform either location into powerhouse producers of high-end semiconductors for smartphones and advanced computing applications.

Some more ambitious investment projects have had setbacks as well. For example, two TSMC fabs under construction in Arizona are behind schedule. TSMC confirmed earlier this year that, contrary to earlier expectations, the second fab would not be able to produce the most advanced chips. Delays have also hit a Samsung chip fab in Texas.

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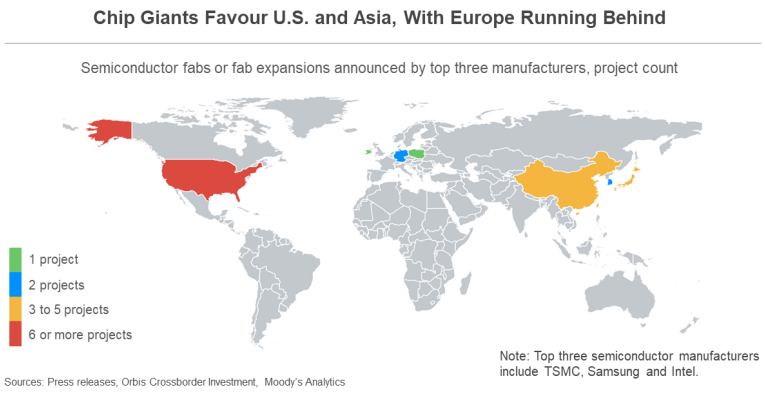
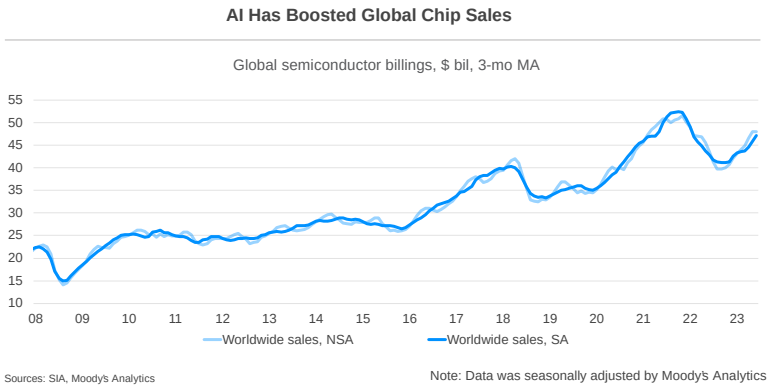


TSMC's first semiconductor fab in Japan has fared better. Located in Kumamoto, a city on the island of Kyushu, the plant officially opened on 24 February. The timing proved serendipitous. A week before, the Nikkei 225 stock index broke its record high. That was set in 1989, when a booming Japan dominated global semiconductor production. Seeing the Nikkei break its old record on the back of booming tech stocks and a weak yen, at a time when modern Japan is looking towards chips to reinvigorate its economy, was fitting timing. Although the Kumamoto fab is making chips of lower complexity, the company recently unveiled plans to establish another fab in Kumamoto to produce more sophisticated designs.

Several factors will keep chip and electronics production in Asia for the foreseeable future. Asia's supply chain offers a significant geographical advantage that would be challenging for other regions to replicate. Easy access to massive chip production capacity, materials, and chipmaking equipment provides Asian manufacturers with a crucial edge. Having end consumers, from carmakers to producers of consumer electronics, right next door also helps. Asian economies are attractive for other reasons, too, including favourable exchange rates. In particular, the yen has depreciated more than 40% over the past three years, making Japan an affordable production base.



Most important, though, is that large chipmakers are showing little inclination to relocate from their home economies. Taiwanese and South Korean chipmakers benefit from preferential access to land, water and other resources in their domestic markets, making chip production at home significantly more cost-effective than in the U.S. or Europe. TSMC and Samsung both boast massive production capacity at home that can churn out chips for a world craving bleeding-edge semiconductors to power artificial intelligence applications. In an era when a new high-end chip fab easily costs $10 billion, there is little commercial incentive to start over elsewhere. That means fabs under construction abroad are mostly an effort to diversify production bases rather than replace production at home.

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