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FROM DOMINATION TO CO-CREATION: HOW TAIWAN SUSTAINS SEMICONDUCTOR LEADERSHIP THROUGH ADAPTIVE INDUSTRIAL POLICY

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Amid heightened geopolitical tensions, global supply chains are experiencing an unprecedented realignment. Semiconductors have emerged as a strategic asset, an industry where Taiwan has cemented global leadership. Its tech expertise, and robust democracy underpin Taiwan's strategic value and reliability. While the EU has turned to large-scale subsidies to localize semiconductor production, Taiwan's success is not the product of any single policy instrument, but reflects a long-term trajectory of institutional foresight, public-private synergy, and adaptive international engagement. As Taiwan's experience shows, building lasting technological capacity requires more than subsidies. It is about crafting coherent ecosystems, where both state and market roles evolve in tandem. As like-minded partners, closer cooperation between Europe and Taiwan can strengthen mutual resilience. This issue brief discusses how Taiwan's model provides a blueprint for building economic resilience and technological leadership in a hyper-connected world.

In the aftermath of COVID-19 and with heightened geopolitical tensions, global supply chains are experiencing an unprecedented realignment. Semiconductors have quickly emerged as a strategic asset, prompting major economies to reassert technological sovereignty as a means to achieving the central objectives of innovation policy and, therefore, effectively compete in the emerging tech race. At the same time, technology-based competition has become increasingly linked to a more comprehensive type of rivalry between different political systems.

Chips play a central role in digital transformation, essential to all industries, including the car industry, communications, space, defense, and data processing, to name a few. Taiwan, the 8th largest economy in Asia and the 21st largest globally, has long been a central actor in the global electronics ecosystem, ranking first by global market share in foundry services and chip packaging and testing, and second in design. Taiwan Semiconductor Manufacturing Company (TSMC) held a 64 percent share of the global foundry market in 2024.¹ Yet, Taiwan's international status remains undetermined, and the island faces an existential threat from the People's Republic of China (PRC). The PRC, the world's second-largest economy, locked in a strategic rivalry with the United States, claims the island as its own, although it never ruled it—a claim Taiwan rejects.

The pandemic exacerbated the U.S.-China rivalry, with technology and Taiwan emerging as the main arenas of competition. China has become a serious competitor in artificial intelligence (AI), 5G, quantum information science, biotechnology and green energy, all considered the foundational technologies of the 21st century. While the U.S. has retained a dominant position in the semiconductor industry for almost half a century, China's campaign to become a semiconductor powerhouse in key areas, namely semiconductor fabrication and design, has yielded significant results; its potential to become a leader can no longer be discounted. In addition, China has openly linked this ambition to the debate between different political systems and values.

Driven by the fear of losing its competitive edge in the semiconductor industry and falling behind in the international tech race, the US enacted the *CHIPS and Science Act*, while the European Union (EU) followed with the *EU Chips Act* both embedding large-scale subsidies to localize semiconductor production. Supply chain concerns have prompted them both to invest in resilience and reduce external dependencies by incentivizing the reshoring of production. In this context, they consider cooperation with Taiwan to be of strategic importance, just as they are Supply chain concerns have prompted both the U.S. and EU to invest in resilience and reduce external dependencies by incentivizing the reshoring of production. In this context, they consider cooperation with Taiwan to be of strategic importance, just as they are rethinking their China policies.

rethinking their China policies, while Beijing is intensifying its pressure on the island.²

Against this backdrop, several vital questions have emerged: How is Taiwan, the world's semiconductor powerhouse, responding to shifts in the global chip industry and growing geostrategic competition? Does it match subsidyheavy industrial strategies to maintain its edge? Most importantly, amid growing diplomatic isolation and increasing gray-zone pressure from the PRC, can Taiwan retain its leadership position in the semiconductor industry, capitalize on global supply chain changes and catalyze its industrial transformation?

The answer is nuanced: Taiwan is taking a different route—one rooted in systemic design rather than subsidy-driven industrial protectionism. This issue brief provides an overview of the path Taiwan has followed to cement its leadership position in the semiconductor industry. It argues that Taiwan's semiconductor success is not the product of any single policy instrument, but reflects a longterm trajectory of institutional foresight, publicprivate synergy, and adaptive international engagement. As like-minded partners, closer cooperation between Europe and Taiwan can strengthen mutual resilience and tech sovereignty. Studying Taiwan's experience offers valuable insights: building lasting technological capacity requires more than subsidies. It is about crafting coherent ecosystems, where both state and market roles evolve in tandem.

Holding the Line: Taiwan's Tech Sector under Gray-Zone Pressure

Taiwan's semiconductor industry does not exist in a vacuum. It operates under and despite constant threat from the PRC, which claims it as part of its territory. The PRC has used hybrid warfare to intimidate the island, including disinformation, cyberattacks, military incursions into its airspace, simulations of a naval blockade and selective economic coercion. Beijing's campaign against Taiwan has been described as a textbook on subversion, cyber and political harassment, a compelling case study for understanding gray zone challenges.³ Ironically, while China relies heavily on Taiwanese chips, it simultaneously seeks to undermine Taiwan's global space. The U.S. and the EU recognize

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China's coercive tactics pose material risks: Taiwan's chip industry depends on stable maritime energy imports and high-end equipment flows. At present, Taiwan still imports 98 percent of its energy through maritime shipping routes, and holds no strategic reserves or secure storage facilities, making it extremely vulnerable. Any disruption to Taiwan's energy supplies would impact its ability to produce advanced chips. The chip industry relies heavily on electricity produced from gas and coal, yet Taiwan lacks strategic petroleum reserve bases and secure oil storage facilities.⁵ Any disruption would ripple across global industries. In such an environment, Taiwan's semiconductor strategy is not merely economic but existential.

Roots of Taiwan's Semiconductor Prowess: Vision and Public-Private Co-Creation

Taiwan's semiconductor dominance today is not a product of reactive policies but the result of visionary planning and strategic foresight, a process rooted in the 1970s. At the time, Taiwan faced profound geopolitical isolation losing its United Nations seat and seeing its diplomatic ties with the U.S. severed, with Washington switching recognition from Taiwan to Beijing. Economically, it needed to shift from labor-intensive manufacturing to high-tech industry, and move the economy up the value chain. Politically, it has had to deal with an increasingly assertive China focused on increase Taipei's diplomatic isolation. While undergoing a democratic transition that started in the 1970s and culminating in the first direct presidential election in 1996, consecutive governments in Taipei have had to simultaneously manage an assertive neighbor invest in economic growth. As its democracy has consolidated over the past five decades, Taiwan has emerged as a pivotal node in the global semiconductor supply chain and an indispensable part of the global economy. The government-led process of economic development included bold steps: in 1980, it established the Hsinchu Science Park, recruited diaspora talent, and facilitated public-private collaboration. Statesmen like Sun Yun-suan and Li Kuo-ting laid the policy groundwork, while industry leaders like Morris Chang executed it, creating a full-spectrum semiconductor ecosystem-from IC design and foundries to OSAT (outsourced semiconductor assembly and test).

By the 1990s, Taiwan's industrial policy had matured. The democratization process and global economic liberalization, especially after Taiwan joined the WTO in 2002, led to a shift in policy style-from direct intervention to ecosystem development. Rather than selecting national champions or offering direct financial support, the Taiwanese government focused on indirect yet strategic roles. These included investing in R&D and infrastructure; ensuring stable electricity and water supply; reforming enhancing university-industry regulations; collaboration and supporting global connectivity for local firms. This approach embodies the philosophy of post-industrial policy: the state does not decide who should win, but ensures fertile ground where many can thrive.

Crucially, this was not a top-down subsidybased model. Instead, Taiwan developed a cocreation system that blended state planning, private sector innovation, talent reintegration, and international engagement. Its expertise in the semiconductor industry, together with its robust The democratization process and global economic liberalization, especially after Taiwan joined the WTO in 2002, led to a shift in policy style—from direct intervention to ecosystem development. This approach embodies the philosophy of post-industrial policy: the state does not decide who should win, but ensures fertile ground where many can thrive.

democracy, has ensured Taiwan's strategic value and made it a trustworthy partner for economies across the globe. At present, the semiconductor industry is a key pillar of Taiwan's economy in terms of its output and share of exports. In 2023, the total industry output value was USD 139 billion, equal to 18.4 percent of the island's GDP, while semiconductor exports amounted to USD 167 billion, accounting for 38.5 percent of Taiwan's exports.⁶

Still, one question may linger for outside observers: Why isn't Taiwan offering massive subsidies to retain semiconductor manufacturing at home? The answer lies in assessing "market failure." In regions like the EU or the U.S., where commercial incentives may not suffice to support capital-intensive fabs, government intervention fills the gap. In Taiwan, however, the semiconductor sector already operates on solid commercial fundamentals with a deep client base and global trust. Thus, instead of filling financial gaps, Taiwan's policies target structural bottlenecks—such as supply chain resilience, talent pipelines, and geopolitical risk mitigation.

Post-Pandemic Strategy: From Chip-Making to Global Co-Innovation

In contrast to the subsidy-led responses of Western democracies, Taiwan's post-pandemic policy recalibration focused on enhancing existing strengths and addressing structural bottlenecks. First, Taiwan has doubled down on attracting and retaining semiconductor talentboth domestic and international. Its declining talent pool remains a serious challenge for the chip industry, just as the island competes for talent internationally with vital players such as the U.S., China, Japan, Korea, and the EU. International competition for chipmakers may further exacerbate its existing shortages. response, the Taiwanese government passed the National Key Fields Industry-University Cooperation and Skilled Personnel Training Act in 2021 to strengthen industry-academia collaboration and develop high-level technical talent. Since then, six major universities have established Colleges of Semiconductor Research,

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Second, recognizing that advanced semiconductor manufacturing depends on robust infrastructure, Taiwan has invested in improving water and energy security, critical for high-volume fabs. Power grid resilience, renewable energy integration, and water reclamation projects have become central to national industrial planning.

Third, instead of competing on subsidies, Taiwan has sought to remain indispensable through innovation. Government-backed initiatives have prioritized public-private research consortia focused on next-generation technologies such as heterogeneous integration, chiplet architectures, etc. Collaboration with global partners—ranging from leading fabless, advanced equipment and material suppliers—through cross-border supply chain alliances or participation in international standard-setting bodies has reinforced Taiwan's global embeddedness.

A cornerstone of this approach is the Chip-Based Industrial Innovation Program (CBI, 晶 創台灣方案) launched in 2023 as a flagship element of Taiwan's post-pandemic industrial strategy.⁷ With a planned budget of NT\$300 billion (approximately €9 billion) over 10 years, CBI represents the government's most ambitious effort yet to future-proof Taiwan's semiconductor advantage.

CBI is structured around four key pillars: One, **Innovation Acceleration**: Advancing front-end breakthroughs, including chiplet integration, heterogeneous integration, and semiconductorrelated AI applications; Two, **Ecosystem Expansion**: Encouraging cross-sector collaboration between ICT, medical devices, automotive electronics, and industrial automation to drive demandside innovation; Three, International Linkages: Promoting co-development with global leaders such as NVIDIA, ASML, and AMD—to maintain strategic relevance in global technology chains; Four, Resilience Enhancement: Investing in critical materials, equipment, and supply chain diversification to reduce exposure to single-point failures. Rather than direct subsidies to specific fabs, CBI serves as a connective tissue—aligning firms, research institutions, and global partners around strategic themes.

Europe-Taiwan Complementarity: Strategic Sovereignty through Cooperation

The EU's pursuit of technological sovereignty is both understandable and necessary, driven by the fear of declining industrial competitiveness and global relevance, which would leave the bloc less influential in shaping new international standards for industries. Fragmentation and underinvestment have hindered innovation across the bloc, forcing European startups, innovators and industrial players to relocate, particularly to the U.S. Regulatory fragmentation across member-states has made it harder and more expensive for companies to grow, slowing down innovation. Still, Europe's strength lies in its ability to set rules in areas such as data protection, green innovation and AI governance, with the ambition to assert its authority over critical digital infrastructure.

Some experts have, however, argued that to become more sovereign in an increasingly interlinked economy, the EU needs to focus on becoming a global leader in economic innovation, not just a leader in regulation. As such, policymaking towards a European technological sovereignty that benefits the greatest number of Europeans should aim for a regulatory environment where tech companies and tech In contrast to the subsidyled responses of Western democracies, Taiwan's post-pandemic policy recalibration focused on enhancing existing strengths and addressing structural bottlenecks: attracting and retaining semiconductor talent; investing in improving water and energy security, critical for high-volume fabs; and fostering innovation.

adopters can thrive across EU member-states' national borders. In order to become a global leader in innovation, therefore, the EU needs a real Single Market where companies can scale up and then compete globally, supplemented by procompetitive policies and incentives for research and investment.⁸

Whether the EU can strike the right balance between its regulatory power and the need to foster innovation remains an open question. In the semiconductor industry, the European Chips Act was designed as a key step for the EU's technological sovereignty. One of the five strategic objectives is to develop an in-depth understanding of the global semiconductor supply chain.⁹ With its solid know-how and experience in technology, Taiwan can be a reliable and longterm partner in this regard.

Taiwan is the EU's 13th largest trading partner and a key supplier of high-tech goods, in particular semiconductors. The EU, therefore, relies on Taiwan's tech, just as it seeks to strengthen its own capacity and tech sovereignty. Taiwan offers a unique case of a non-subsidy-based model that aligns market efficiency with policy foresight. For a small, export-dependent economy like Taiwan, economic security stems not from protectionism but from open and deep integration with global networks. Isolation would be a risk, not a solution. In this line of thinking, the Taiwanese government has prioritized cooperation with international semiconductor suppliers in three areas, namely joining Taiwan's semiconductor cluster, exploring the growing market for semiconductor equipment and materials, and finally, establishing R&D centers and local operations to tap into the larger Asia-Pacific market.10

In May 2025, Taiwan's President Lai Ching-te said Taiwan would continue to strengthen economic ties with European partners and "jointly build resilient, promising and non-red supply chains" for semiconductors.¹¹ In recent years, Taiwan has gained more visibility in Europe, and bilateral

In the semiconductor industry, the European Chips Act was designed as a key step for the EU's technological sovereignty. One of the five strategic objectives is to develop an in-depth understanding of the global semiconductor supply chain. With its solid know-how and experience in technology, Taiwan can be a reliable and long-term partner in this regard. mutual awareness has increased.¹² The two sides have established a solid economic and political framework that has enabled engagement through, for example, an annual EU-Taiwan Investment Forum, sectoral cooperation and a modernized economic and trade dialogue. Taiwan remains at the core of the EU's Indo-Pacific Strategy, and bilateral cooperation has grown within the framework of the EU's One China Policy.¹³

Taiwan has already attracted top European semiconductor companies and suppliers. Dutchbased ASML, the only company that produces advanced extreme ultraviolet (EUV) lithography machines needed to make cutting-edge chips, received approval in August 2023 to invest USD330 million to set up its sixth factory in Taiwan for the development and manufacturing of 2-nanometer wafer optical measurement equipment.¹⁴ Companies in EU member-states have made progress in concrete cooperation with Taiwanese companies. TSMC's EUR10 billion plant in Dresden, supported by EU and German state subsidies, represents a cornerstone of Germany's car industry development. Further opportunities exist to broaden cooperationacross chip design, testing, AI-driven applications, green manufacturing, and cybersecurity. Taiwan is open to deeper collaboration and knowledge exchange. It does not seek to dominate, but to co-create. Europe is seeking to catch up and strengthen tech sovereignty. Engaging each other as systemic partners can lead to more resilient and innovative supply chains. Closer cooperation is therefore of mutual interest.

Beyond Subsidies, Toward Strategic Ecosystems

Taiwan's semiconductor success is not the product of any single policy instrument. It reflects a longterm trajectory of institutional foresight, publicprivate synergy, and adaptive international engagement. In a world drifting toward technonationalism, Taiwan demonstrates how strategic resilience can be built through interdependence, not isolation. By applying systems thinking, Taiwan sustains its competitiveness by reducing structural friction, deepening global linkages, and embedding itself within innovation networks.

For European think tanks and policymakers, studying Taiwan's experience offers valuable insights: building lasting technological capacity is not just about writing large checks. It is about crafting coherent ecosystems where both state and market roles evolve in tandem. Understanding Taiwan's model offers more than admiration—it provides a blueprint for how economic resilience and technological leadership can be built in a hyper-connected world.

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