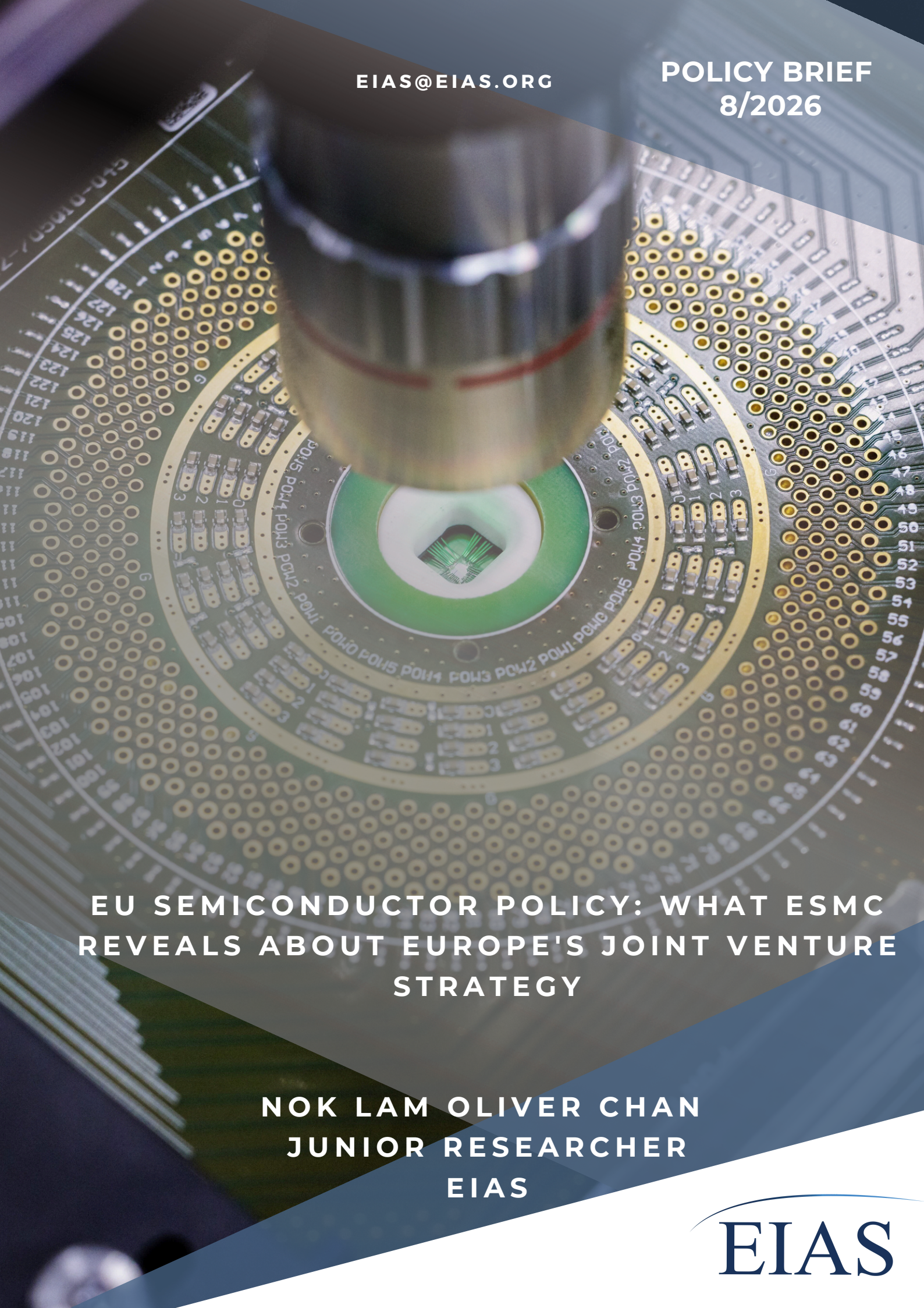

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POLICY BRIEF
8/2026

EU SEMICONDUCTOR POLICY: WHAT ESMC REVEALS ABOUT EUROPE'S JOINT VENTURE STRATEGY

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EU Semiconductor Policy: What ESMC Reveals About Europe's Joint Venture Strategy

The Taiwan Semiconductor Manufacturing Company (TSMC), *which produces the most advanced chips in the world, is positioning itself in a strategic position in the global economy. On one hand, the geopolitical tensions and domestic resource constraints are pushing TSMC to diversify manufacturing overseas. On the other, the European Union seeks to attract investment through the European Chips Act to reduce dependence on external suppliers. It has resulted in the EU–TSMC joint venture "European Semiconductor Manufacturing Company (ESMC)", a pilot initiative to assess whether TSMC's efficient production model can be adopted to Europe. Although the European Chips Act provides subsidies, it fails to address the underlying structural barrier. The sustained EU–TSMC semiconductor ecosystem cannot be built with financial support alone, but requires comprehensive reforms to address regulatory fragmentation across the EU's single market and knowledge transfer through TSMC's production and management model. Therefore, to strengthen EU–TSMC cooperation, prioritising regulatory simplification, reducing administrative fragmentation and establishing an exchange and training scheme that facilitates efficiency and training programmes that support operational learning from TSMC's business model.*

The Taiwan Semiconductor Manufacturing Company (TSMC) produces 90% of the world's most advanced chips and 60% of all semiconductors. The high level of concentration of such a supply chain architecture poses significant risks to every economy that depends on it. Both the United States and the European Union rely heavily on chips fabricated by TSMC. Cross-strait tensions between Taiwan and China could trigger severe economic disruption, as Bloomberg Economics estimates such a conflict would cost the global economy 10 trillion USD in the first year alone.

Yet, the imperative for TSMC to diversify goes beyond geopolitical risks. TSMC is facing mounting domestic challenges that constrain its expansion on the island. From 2015 to 2019, TSMC's total water consumption surged by 70%. On the energy side, TSMC drew 7.3% of the region's supply in 2024, and could reach 12.5% when 2nm production matures. To an even greater extent, Greenpeace has suggested that by 2030, the local semiconductor manufacturing industry will consume twice as much electricity as New Zealand did in 2021, raising serious questions about TSMC's capacity to support further domestic expansion. Furthermore, the local available industrial space further exacerbates the situation as it is reaching its limit. All together, these challenges make overseas expansion not merely a strategic choice but an operational necessity for TSMC.

While the United States and Japan have become preferred destinations for TSMC's overseas semiconductor investment, Europe has struggled to position itself as an equally attractive destination. This is not only a question of production volume but also a technological gap. Europe has lagged in the capacity to fabricate advanced nodes below 7nm, an area in which TSCM maintains an uncontested lead. This gap highlighted Europe's limited capabilities in leading-edge semiconductor design and manufacturing, and exposed critical vulnerabilities in the EU's supply chains for the automotive, telecommunications, and defence industries. This vulnerability is further exacerbated as the EU consumes around 20% of the world's chips, a number on the rise, while it only produces about 9% of them, dropping from 25% in 2000, as many companies moved to Asia. The EU responded by launching the European Chips Act, which primarily provides public and private financial support to enhance its microchip manufacturing capacity up to 20% of its global market share . However, this development revealed a structural problem with the Act, which later became evident in July 2025 through the sudden reversal of Intel's expansion plans in the region. At that time, Intel officially confirmed the cancellation of its two high-profile semiconductor investments in Europe: a megafab in Magdeburg, with a planned 30 billion EURO investment supported by 9.9 billion EURO in subsidies under the European Chips Act, and a test site near Wroclaw in Poland with 1.7 billion EURO in subsidies. These projects faced persistent headwinds, such as construction costs, escalating competition and notably the regulator challenges.

Intel's withdrawal has drawn renewed attention to the viability of the European Semiconductor Manufacturing Company (ESMC), a joint venture between TSMC and European firms including Bosch, Infineon, and NXP. The project, which will produce 22 nm and 28 nm chips primarily for the automotive and industrial sectors, aims to bring elements of TSMC's semiconductor production model to Europe. However, Hugo Kuo, the COO of an AI company in France,

cautions that the success of emerging semiconductor joint ventures such as ESMC cannot be secured through public funding alone. Even with substantial financial support, European firms may struggle to match TSMC's production efficiency unless Europe addresses the deeper cultural, regulatory, and operational constraints that hinder high-efficiency chip production, a challenge also illustrated by TSMC's experience in Arizona. For this reason, the ESMC project in Dresden provides a relevant Germany focused case study through which to examine the regulatory challenges and cultural dynamics shaping EU–TSMC semiconductor cooperation. In other words, the central challenge is not simply a lack of capital, but a structural gap that funding alone cannot close.

1. Structural Challenges: Regulatory Fragmentation and Cultural Divergence

1.1 Adapting TSMC's Production and Management Model

In a personal interview with EIAS, Hugo Kuo mentioned that one of the most significant barriers to EU-TSMC cooperation is the gap with European work cultures. Despite the European Chips Act providing financial incentives and support for semiconductor investment, TSMC's success is derived from a distinctive industrial culture that complements its technological capabilities and contributes significantly to manufacturing efficiency.

TSMC relies on a highly flexible and responsive production model, which is often contrasted with Europe's strong labour protections and shorter workweeks. In TSMC, plants run continuously, with workers and managers often being expected to respond rapidly to production issues and changing operational demand. This "24/7 semiconductor ethos" has been a key to the success of TSMC's global competitiveness in the semiconductor industry. By comparison, countries such as Germany maintain strong labour protection, strict working-time regulations, and influential workers' unions. Rather than changing labour regulations, the challenge is to identify which elements of TSMC's operational and management model can be replicated in Europe within the existing institutional framework.

TSMC's experience in establishing semiconductor manufacturing facilities abroad suggests that such cultural differences can generate labour tensions. At TSMC's Arizona facility, workplace culture has become a source of controversy. A lawsuit has alleged that the company favoured East Asianapplicants in its hiring practices, partly because they were perceived as more familiar

with TSMC's existing work culture. Similar challenges have been observed in the Japanese Advanced Semiconductor Manufacturing (JASM), a semiconductor joint venture with TSMC, where many Japanese employees at JASM no longer work overtime under the new regulations, unlike their TSMC counterparts.

According to Kuo, TSMC is increasingly aware that Europe's operating environment differs from their own; it is difficult to replicate TSMC's manufacturing model abroad. As a result, a more realistic form of cooperation may lie in locating R&D activities in Europe while maintaining advanced, high-efficiency production in Taiwan. However, operational differences also remain in R&D cooperation. Firms such as TSMC tend to prioritise the early identification of future markets for industrialisation, outcome-oriented cooperation, sourcing solutions to specific technological challenges and are driven commercially. In contrast, European partners favour more open-ended, exploratory, and process-driven research from which practical applications emerge gradually. Despite the difference in expectations creating coordination challenges regarding timelines, project design and anticipated outcome, progress has been made; recent initiatives also suggest the R&D cooperation approach is not impossible; for example, Global Technology and the French semiconductor company SiPearl have launched a joint R&D initiative to enhance technological cooperation, including semiconductor design. It illustrates that the cultural difference is not insurmountable, but needs to be addressed first.

1.2 Fragmented Regulatory Environment

1.2.1 Holistic view at EU Level: Uneven Integration in the Single Market

Despite progress in European integration over the past years, its integration remains incomplete. Investors often face different regulatory rules on taxation, labour and company laws, and foreign direct investment restrictions across Member States. This fragmentation has created intra-EU barriers that hinder cross-border services and goods. The head of AI policy at AWS, Sasha Rubel mentioned that 42% of overall European IT spend goes to compliance, compared to around 20% in Japan. She described this as an invisible tax on the AI-related industry, and the IMF estimates that structural barriers are equivalent to an internal tariff rate of 110% on services alone. For TSMC, this is not an ideal environment to operate an efficient production model.

The fragmented regulatory environment manifests itself in three main ways. First, at the legislative level, member states continue to introduce unilateral national measures in areas already covered by EU provisions. At the same time, divergent interpretations of EU law across member states undermine the EU's intended role as a source of regulatory harmonisation.

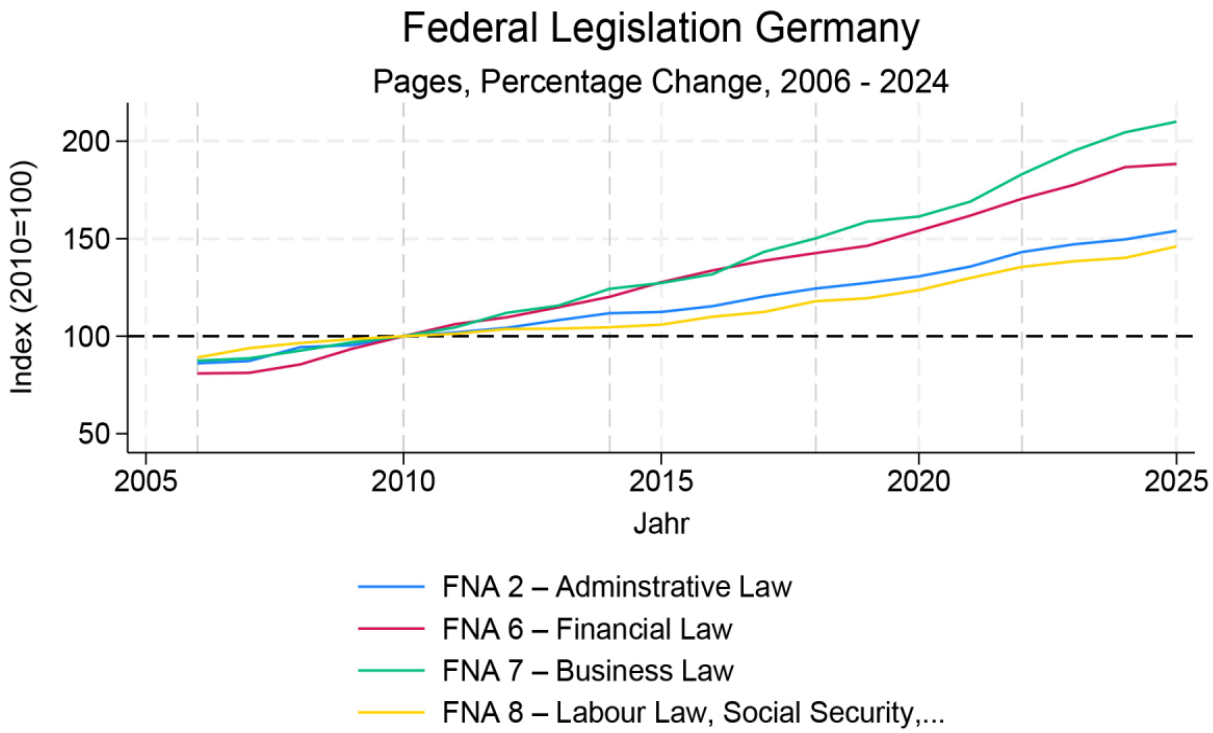
Secondly, in terms of taxation, the challenge for East-Asian firms is not simply about the tax level itself, but about adapting to the fact that each member state operates an entirely different taxation system with no harmonised framework across borders. For example, corporate tax rates can vary from 9% in Hungary to Malta's 35%. The complexity of the tax system and administrative burden in various Member States will constrain the expansion of TSMC activities across multiple Member States.

Thirdly, labour regulations are the area in which member states retain substantial autonomy, including national regulation, subnational levels of governance (e.g. provinces, states), and supranational contexts, such as the EU. Therefore, each member state sets its own enforcement models as labour regulation is considered a social policy and does not fall under the EU's exclusive competence. Consequently, labour regulation across Europe is rarely one-size-fits-all, resulting in a multi-layered structure and often an uneven regulatory landscape, which can complicate cooperation between TSMC and the EU.

1.2.2 Germany Case: Bureaucratic Complexities

Germany provides a particularly good case study for revealing the regulatory challenges facing semiconductor investment in Europe. The bureaucratic complexities are a central challenge for firms such as TSMC. According to the ifo Institute, excessive bureaucracy costs Germany up to 146 billion euros a year in lost economic output. These burdens weaken support for the semiconductor industry's development, undermining essential conditions for sustainable growth, such as efficiency and cost-effectiveness.

Figure 1: Federal Legislation Germany



Source: Analysis by Prof. Dr. Stefan Wagner based on data provided by www.buzer.de.
Dashed lines indicate years with federal elections.

Figure 1 shows that federal legislation has grown by 60% since 2010, as business laws and financial regulations increased significantly. Even in a simplified and integrated German regulatory environment, investors face a multi-layered regulatory obstacle not only across different types of law but also fragmented permitting across federal, state, and municipal authorities. For instance, unlike Taiwan's comparatively straightforward corporate tax framework, Germany's tax system has become increasingly complex, which itself is composed of three overlapping layers: a federal corporate tax, a solidarity surcharge, and municipal taxes that vary from city to city.

Consequently, TSMC needs to allocate significant financial and human resources to managing multiple national tax systems, labour mobility, and reporting obligations, diverting focus from innovation expansion, market competition and efficiency. Professor Stefan Wagner points out that: "Regulation in Germany is not decreasing – it is increasing. As a result, the country has become less and less attractive as a business location."

Kuo believes that the main challenges for East-Asian investors in Europe are regulatory inefficiencies, which prevent them from matching their own operational effectiveness, even

when offering higher salaries to recruit in the European Market. Therefore, the critical question for the ESMC's joint venture project is not whether sufficient subsidies are available, but whether the surrounding regulatory environment can deliver the efficiency needed to sustain operations once public support declines.

2. The Policy Mismatch: Why the EU Chips Act Cannot Close the Gap Alone

The European Chips Act initiative seeks to work with three pillars collectively to increase Europe's share of global semiconductor production to 20% by 2030, and reduce strategic vulnerabilities in supply chains through the synergy of the three key pillars.

However, the limitation of the Act does not lie in its ambition but in the mismatch between policy and the emerging obstacles. Regarding the first obstacle, the European Chips Act remains silent on the operational differences that underpin TSMC's competitiveness. In addition, TSMC's experiences in both Arizona and Japan from the outset demonstrated that substantial public funding does not automatically eliminate work culture friction.

Secondly, the European Chips Act introduces a mechanism to accelerate permitting procedures, but it does not address the regulatory complexity across the Single Market. In Article 18, the EU Chips Act highlights that the national authorities should give these projects the most rapid treatment legally possible by introducing a "fast-tracking mechanism" that accelerates individual approval timelines with respect to the member state national law. However, it does not resolve the regulatory fragmentation, meaning that while the approval procedure may be faster, in practice, investors still need to navigate a permitting system that remains distributed across different administrative levels. In the Kumamoto JSMC case, the lesson is clear: while financial support plays an important role, these challenges cannot be solved merely through subsidies but by building an ecosystem. Instead, a large-scale semiconductor success was contingent upon a coherent ecosystem of public support and streamlined governance.

Despite the European Chips Act being introduced with a "fast-tracking mechanism" under Article 18, which allows fast permitting approval, fragmentation remains as mentioned. The EU should build on existing provisions by establishing an integrated "one-stop-shop" mechanism to not only accelerate the approval procedure, but also to consolidate different levels and types of regulation into a "single coordinated administrative procedure", including procedures for

taxation, permitting, and industrial licensing, in order to reduce administrative burden, create predictability for foreign investors and establish a simplified semiconductor industrial ecosystem. Without it, Europe risks creating a self-sustaining semiconductor industrial ecosystem.

A main reason for the success of TSMC's semiconductor production lies in its production culture and labour organisation; therefore, member states should establish an exchange scheme that enables engineering managers to rotate between East-Asian and European semiconductor facilities in order to foster work culture exchange and operational alignment. In parallel, the EU should support the creation of Asia-led semiconductor training centres to embed their expertise in production and strengthen local workforce capability.

To further capitalise on EU-TSMC strength, establishing a long-term research centre between the two regions can create a stable dynamic channel for semiconductor SMEs and training. TSMC can contribute hardware skills and content to Europe while Europe provides data which Taiwan is less rich in. This complementary initiative can enhance the resilience of the EU semiconductor ecosystem over the long term, aligning with the goal of the European Chip Act. These measures would allow TSMC to position itself as a strategic investor and innovation partner rather than a supplier. In this sense, TSMC is a complementary partner rather than a competitor in helping to align the EU's long-term digital regulations and semiconductor policy.

3. Opportunity: Joint Venture Model can be a Starting Point

For Europe and Germany, the key takeaway is that, although ESMC remains in its early stages, it provides a useful framework for the joint venture model that can be applied to the design of future multinational corporations. The joint venture represents one of the higher forms of long-term commercial cooperation with another country. The cooperation forms are based on the capital invested, which may be expressed in different forms, such as R&D, productional, sales-oriented, procuremental, know-how, and (non-) copyrighted industrial property.

Combining these complementary assets enables firms to enhance their competitiveness. The local firm can provide unique entrepreneurial knowledge of local conditions, and, for a multinational firm, possesses technology that can offer cheaper inputs and have better ties to the government and important buyers. As Day and Wensley further highlighted, joint ventures

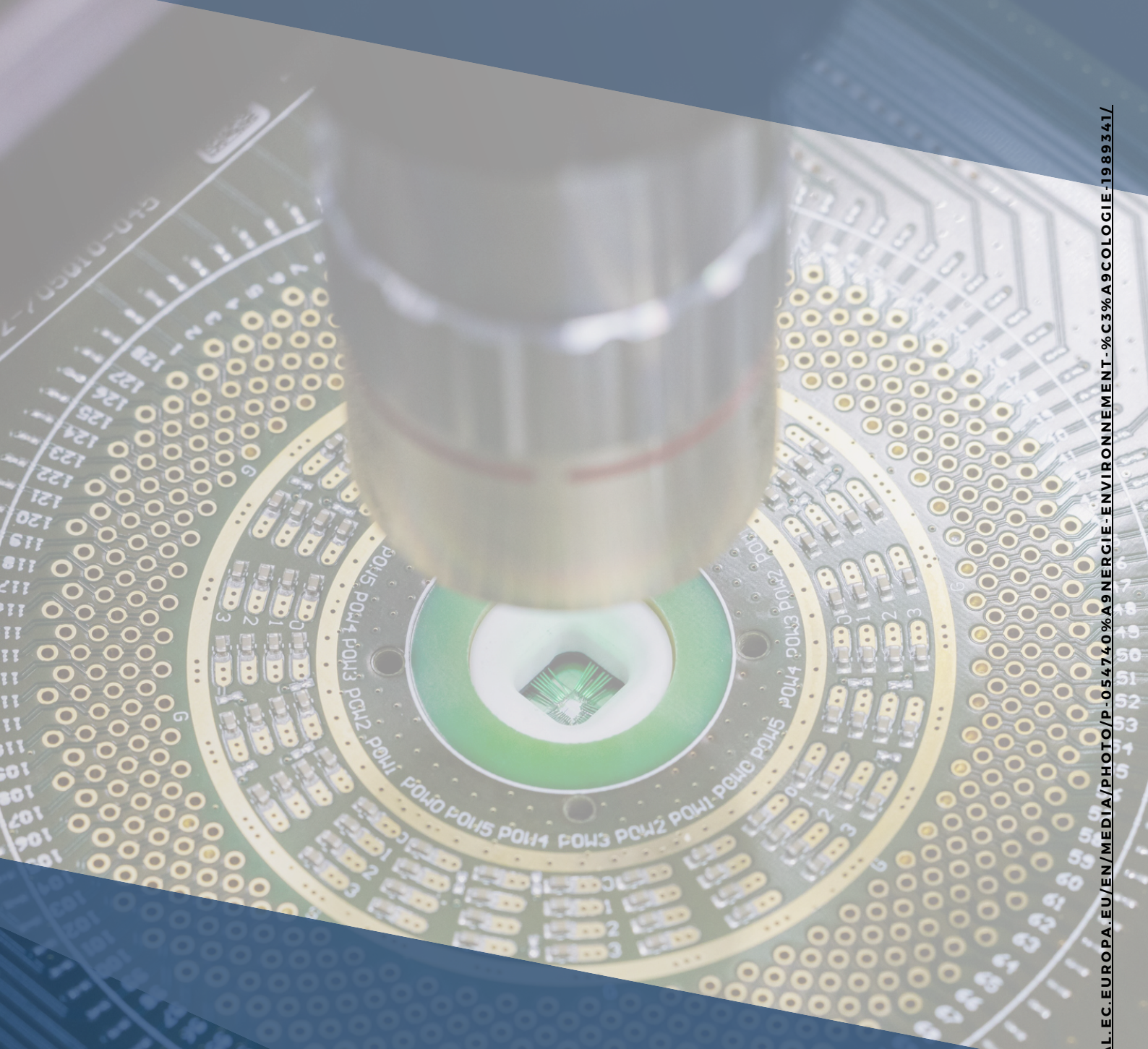
primarily bring superior skills and superior resources. "Superior skills" refers to the major resources of human talent, know-how, abilities, or competencies. "Superior resources" encompass major stocks of financial and other capital, greater production capacity, better location, and improved access to supplies.

For instance, in the Japanese market, some U.S. firms tend to collaborate with local Japanese partners simply because the Japanese firms have much better knowledge of the local distribution networks. Moreover, the joint ventures can significantly increase their share values, as McConnell and Nantell show for a sample of 210 firms listed in New York and the American Stock Exchange.

Beyond these immediate market gains, the joint venture could potentially create a sustainable competitive advantage. Traditionally, competitive advantage refers to the attributes and resources that enable a firm to outperform competitors in the same industry or product market. When this advantage is "sustainable", it implies a type of protection offered by such attributes and resources. In practice, sustainable competitive advantage simply means that the company is miles ahead of the nearest competitor, since the joint venture can bring a range of sources, such as technology, supply differences, or product differentiation.

To sum up, Europe has not yet been able to create an attractive business environment that encourages TSMC to invest in Europe without financial support from the EU Chips Act. As an expert from the European Semiconductor Industry Association observed, current EU-TSMC joint venture initiatives appear to be driven more by strategic and political considerations than by commercial incentives. Therefore, what becomes clearer is that the EU must improve the semiconductor industry business environment, as well as address the divergence in work culture that underpins the success of TSMC.

Looking ahead, the salient challenges for the European Union are to determine the extent to which regulatory reforms can be pursued in order to enhance the productivity and efficiency of European industry, while preserving European social values.



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