

# EU-TAIWAN SEMICONDUCTOR COOPERATION: LOPSIDED PRIORITIES?

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*The European Union (EU) seeks de facto closer cooperation on chip production with Taiwan. This was underlined during Foreign Minister Joseph Wu's Europe Tour in 2021 and by a more recent EU Parliament delegation to Taipei amid efforts to push for a bilateral investment agreement. Having announced the Chips Act in February 2022, the EU has since held its first high-level talks with a delegation from Taiwan's Ministry of Economy. Meanwhile, reports emerged in 2021 that the world's largest chip manufacturer – TSMC – has been in contact with European officials about setting up local production facilities in the EU. Despite these signs of progress, it appears the EU lacks sufficient understanding of their Taiwanese counterparts' ambitions and priorities. Besides Brussels underestimating the challenge of setting up foundries and overplaying the need to concentrate on cutting-edge chip manufacturing, the EU's strategic ambitions are at odds with both the Taiwanese government and the islands' tech giants. This issue brief critically examines the prospects of EU-Taiwan cooperation on semiconductors and analyzes how Taiwan and the EU can envision a concentrated partnership.*

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## **The EU's Chip Shortage and Taiwan**

Global semiconductor supply chains have been severely disrupted in the last two years due to factory fires, power outages, and draughts on the supplier-side in East Asia,<sup>1</sup> as well as pandemic-related bottlenecks and double ordering amid surging consumer demand.<sup>2</sup> For the European Union (EU), the global chip shortage has been challenging to navigate, as major export industries, including

auto manufacturing, rely heavily on steady inflows of imported semiconductors. Evocative headlines underscoring the shortages' tangible consequences noted industrial conglomerates buying up new washing machines to strip them of their semiconductors for use in industrial modules<sup>3</sup> and auto manufacturers possibly selling unfinished cars at a discount or shutting down production entirely.<sup>4</sup> Average lead times for chip deliveries passed the six-

month mark in April 2022, further exacerbated by the supply chain disruptions caused by the war in Ukraine and renewed Zero-COVID lockdowns in China.<sup>5</sup> Though industry analysts forecast gradual supply chain stabilization by 2023-2024,<sup>6</sup> with manufacturers already bracing themselves for a major demand downturn,<sup>7</sup> soaring global raw material prices are setting the stage for industry-wide price hikes of up to 20 percent through cost-push inflation.<sup>8</sup>

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The protracted shortages have alerted European policymakers to the continent's shrinking share of the world's semiconductor production, which is increasingly consolidating in East Asia. While the EU still holds sizeable market shares in chip manufacturing equipment and silicon wafer production and US tech giants dominate the semiconductor design market, the final manufacturing process is heavily concentrated in just two chip-manufacturing powerhouses. Taiwan and South Korea capture 66 and 17 percent of the global foundry market's value chain, respectively,<sup>9</sup> with Taiwan Semiconductor Manufacturing Corporation (TSMC) alone accounting for over half the market and more than 90 percent of the world's output of most advanced semiconductors.<sup>10</sup> In contrast, the European Semiconductor Industry Association (ESIA) has warned that Europe's share of global semiconductor output (by volume) could dwindle to a mere 5 percent by 2025.<sup>11</sup>

EU-based chip manufacturers have long been lagging behind East Asian foundries due to skyrocketing capital costs and intensifying economies of scale as manufacturing becomes increasingly hyper-specialized.<sup>12</sup> Aside from American Intel's Ireland-based semiconductor plant, European manufacturers completely lack design-and-manufacturing capabilities for semiconductors below the 22-28 nanometer (nm) range.<sup>13</sup> These chips are, by now, already a decade-old production standard chiefly employed in auto-chip manufacturing. For comparison, TSMC and Samsung will begin mass production using the 3-nanometer manufacturing process in the second half of 2022, to be used in flagship smartphones, computers, and eventually self-driving cars.<sup>14</sup> Beyond lagging in manufacturing capabilities, the EU also holds less than 1 percent stake in the global chip design market, not even having a single EU-based company in the global top 50.<sup>15</sup>

Amid unyielding Sino-American rivalry and rising tensions in the Taiwan Strait, EU policymakers have become increasingly anxious about Europe's semiconductor import reliance. To Brussels' apprehension, both Washington and Beijing have demonstrated a growing willingness to unilaterally weaponize trade and financial dependencies in recent diplomatic disputes.<sup>16</sup> A subset of the larger, often-contentious debate on Strategic Autonomy,<sup>17</sup> these concerns have reinvigorated calls for onshoring semiconductor manufacturing, with the EU's *Digital Compass* strategy envisioning a 20 percent share of global semiconductor production by 2030.<sup>18</sup> Yet, most alarming is the potential for a full-on blockade or escalating conflict in the Taiwan Strait, which could ultimately see half the global foundry market cut off or destroyed. With U.S. troops now openly stationed in Taiwan, increasing PLA shows of force in the Taiwan Strait, and repeated White House gaffes on Strategic Ambiguity, this once remote scenario has become less and less implausible.<sup>19</sup> In turn, the frail status quo has pushed Brussels to take a more proactive stance on Taiwan by explicitly linking the continent's security to Taiwan's. Delivering a speech on EU

High Representative/Vice President (HR/VP) Josep Borrell's behalf in October 2021, Commissioner Margarethe Vestager stressed that China's displays of force vis-à-vis Taiwan "may have a direct impact on European security and prosperity."<sup>20</sup>

### Taipei in the EU Chips Act

Ambitions to build back regional semiconductor manufacturing first materialized with the *European Chips Act (ECA)*, announced in Commission President Ursula von der Leyen's 2021 State of the Union address.<sup>21</sup> The ECA seeks to enhance EU "Digital Sovereignty" and improve resilience to supply chain disruptions by boosting domestic semiconductor manufacturing and doubling Europe's global market share.<sup>22</sup> Due to the considerable cost disadvantage for EU chip production compared to production in East Asia, the EU Commission seeks to loosen rules on state aid for chip manufacturing, allowing "targeted" and "proportionate" public support for so-called "first-of-a-kind facilities" in Europe.<sup>23</sup> The act includes €11 billion in direct EU funding for manufacturing subsidies and R&D, seeking to leverage a total of €43 billion in "policy-driven investment" from the public and private sectors by 2030.<sup>24</sup>

Besides funding, the ECA lays out a strategy to address skills shortages within the EU, attract skilled workers, and improve capacity for "smaller and faster chips."<sup>25</sup> It targets the entire value chain, expanding beyond the EU's core expertise of raw material sourcing, manufacturing equipment procurement, and cutting-edge R&D. The ECA calls for improving supply chain knowledge and oversight, chip design, intra-EU manufacturing, and outsourced semiconductor assembly and test (OSAT). Yet, calls for increased collaboration with like-minded partners lie at the heart of the ECA's ambitions. Playing catch-up without cooperation with industry leaders would be prohibitively expensive and time-consuming, not to mention the genuine risk of sliding further behind the cutting-edge competition.<sup>26</sup> Notably, HR/VP Borrell and Competition Commissioner Margrethe Vestager

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have highlighted Taiwan as an essential partner in achieving the goals of the Chips Act, expressing the EU's "interest in enhancing relations and cooperation with Taiwan, within the framework of its one-China policy."<sup>27</sup>

When the ECA was first announced, the Taiwanese Foreign Ministry was quick to stress that there was "tremendous room" for cooperation on semiconductors.<sup>28</sup> Taipei's enthusiastic embrace of potential collaboration followed earlier EU attempts at enhancing engagement in 2021 amid then-deteriorating relations with Beijing.<sup>29</sup> The EU's representative in Taiwan, Filip Grzegorzewski, had sought to court Taiwanese semiconductor businesses by offering more joint investment forums.<sup>30</sup> A flurry of parliamentary and business delegations has since bounced between Taipei and European capitals, with FM Joseph Wu informally visiting Brussels in October 2021 and trade delegations sealing multiple Memorandums of Understanding (MoUs) in Central Eastern Europe in early 2022.<sup>31</sup> Exchanges with Lithuania have born the most fruit, including a \$200 million investment fund and a joint semiconductor center in Vilnius.<sup>32</sup> Though Brussels and Taipei have held lower-level trade and investment talks for decades, the first ministerial-level dialogue was held only in June 2022. While these talks represented a major "breakthrough" in bilateral relations more broadly for the Taiwanese side, EU counterparts have been especially keen to highlight cooperation in

semiconductor manufacturing, in the background courting Taiwanese commitments to high-tech investments, particularly from chip giant TSMC.<sup>33</sup>

### Disjointed Interests?

TSMC's interest in setting up local production in Europe has been rumored since early 2021, with direct EU-TSMC discussions confirmed since at least May 2021.<sup>34</sup> The initial exploratory talks also included South Korean Samsung Electronics, although Samsung has shown no explicit interest for cutting-edge production in the EU.<sup>35</sup> In contrast, TSMC announced preliminary talks with the German government already in August 2021 about potentially setting up local production in Dresden, Saxony.<sup>36</sup> Yet, even as European exchanges with Taiwan have drastically increased over the past year, progress has been slow. In May 2022, Italian newspaper *Corriera Della Serra* reported on Taiwanese representatives approaching Italian authorities for a €10-billion foundry in Northern Italy,<sup>37</sup> suggesting expansion plans for Germany were lagging in real progress. That same month, Berlin and Rome announced state subsidies for semiconductor manufacturing plants worth €14 billion and €4 billion, respectively.<sup>38</sup> However, unlike American competitor Intel,<sup>39</sup> TSMC appears unconvinced by EU subsidy pledges.

In a June report to shareholders, TSMC Chairman Mark Liu stressed that no concrete plans yet existed

for European expansion, noting a lack of chip demand in the EU and discouraging cost overruns during semiconductor fabrication plant (fab) expansion in the United States.<sup>40</sup> In contrast, TSMC began constructing additional semiconductor plants in the U.S. and Japan in 2021, with rumors of possible expansion in Singapore and India.<sup>41</sup> Both nations have been equally keen to attract chip manufacturers, with Singapore already slated to host Taiwan's chip maker United Microelectronics Corporation (UMC).<sup>42</sup> Though unable to compete with the US or Europe pound-for-pound in the subsidy race, both nations are conveniently located closer to demand in East Asia and signal less restrictive subsidy schemes, targeting cheaper, more mature semiconductor technologies.<sup>43</sup>

TSMC's wariness over EU expansion hints at the underlying reality that market fundamentals ultimately come first. As cautioned by FM Wu in April 2022, when tempering expectations for Taiwanese investments in Lithuania, Taipei encourages private investments but cannot command them like Beijing.<sup>44</sup> TSMC Chairman Liu and founder Morris Chang have been particularly vocal, casting doubt on the long-term sustainability of the European market for cutting-edge chips to satiate the immense production volumes required to bring down average costs sufficiently.<sup>45</sup> Currently, the EU hosts none of the world's largest electronics giants, such as Samsung, Xiaomi, or Apple, that consume the most sophisticated chips.<sup>46</sup> Without sufficient local demand, surplus production would need to be exported to and possibly reimported from Asia, resulting in an uncompetitive supply chain. More concretely, TSMC's hesitation toward European expansion also stems from partly diverging priorities. As clarified by Commissioner Vestager, the Chips Act "is not about addressing current shortages" but instead about preparing for the future, as high-end semiconductors are set to see the largest growth in demand in the coming decade.<sup>47</sup> As a result, the ECA has explicitly reserved subsidies for the slightly ambiguous term "first-of-a-kind-facilities," effectively excluding support for older production

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technologies already present in Europe, including the unmet demand TSMC has sought to address.<sup>48</sup>

There are additional concerns about the gap between Brussels' ambition and long-term financial commitments.<sup>49</sup> The goal of doubling Europe's share of global chip manufacturing by 2030 would require a quadrupling of current production levels, given that the overall market is projected to double within the next decade. Yet, even if the EU leveraged the whole – yet unfinanced – €43-billion investment injection, Brussels is still looking to be outspent significantly by all other major semiconductor powers over the coming years.<sup>50</sup> Notably, overambitious goals of turning the EU into a semiconductor manufacturing hub have fallen flat before. In 2013, the Commission's New European Industrial Strategy paper similarly announced a doubling in chip manufacturing capacity by 2020 and an accumulated investment of €100 billion.<sup>51</sup> As such, there is a degree of skepticism among industry experts, with market research company Yolé Development calling the prioritization of cutting-edge chips over intermediary nodes and existing infrastructure “akin to building a cathedral in the desert.”<sup>52</sup> With the Eurozone facing cost-of-living crises and a looming recession, it will require significant continued political capital and willpower to keep up massive corporate subsidy schemes,

especially as calls for reigning in EU fiscal spending grow in the wake of the war in Ukraine.<sup>53</sup>

## Getting Political

Taipei's reservations about setting up cutting-end fabs abroad are often overlooked in discussions surrounding Taiwanese investments in Europe. Since taking office in 2016, President Tsai Ing-wen has been pushing adamantly for business interests to converge more with national interests. Tsai vowed to revise Taiwan's economic strategy to expand and diversify trade partners, turning the island into a global gateway and “manufacturing center of key components.”<sup>54</sup> The strategy, dubbed the “5+2” plan, did not initially include the semiconductor industry, which was added only upon intense lobbying from TSMC, resulting in the “Digital Nation and Innovative Economy Development Programme” (DIGI+). Though primarily speaking to TSMC's leveraging power of government policy, it also indicates how industry and government are intrinsically linked.<sup>55</sup> Responding to EU-TSMC exploratory talks in April 2021, Minister of Economic Affairs Wang noted, “Taiwan will remain the home base for its most advanced technologies.”<sup>56</sup> As such, it is unsurprising that following Wang's comments, TSMC sought more reassurances from possible European partners before making any commitments.

President Tsai further bolstered the role of the semiconductor industry in the “5+2” in an exclusive article penned for *Foreign Affairs* in October 2021. In it, she called it a “silicon shield” that allows Taiwan to protect itself and others from aggressive attempts by authoritarian regimes to disrupt global supply chains.<sup>57</sup> The Legislative Yuan has since amended the National Security Act to include further regulatory supervision and safeguards against foreign leaks of trade secrets and “important core technologies.”<sup>58</sup> Preserving and solidifying Taiwan's position in the global semiconductor supply chain holds significant national security implications, underscoring Taipei's hesitation about exporting cutting-edge fabs abroad. Just as the silicon shield

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deters disruptions of the status quo in the Taiwan Strait, given the immense costs of escalating tensions, it also encourages outside actors to take a more proactive stance on engaging Taipei – as has been seen with the EU. In the long run, the goals inherent to the “silicon shield” align poorly with key elements of the European Chips Act, which unequivocally calls for cutting-edge design and production facilities on European soil.

This is not to say there is no room for cooperation. Indeed, Taipei appears poised to continue making inroads into Europe. Though guarded against technology transfers, Taipei has shown itself more than willing to collaborate on semiconductor R&D, supply chain monitoring, and joint high-tech investments. Yet, if Brussels is serious about engagement, it will likely need to reciprocate beyond rhetorical shows of support.<sup>59</sup> Shortly after the 2022 high-level trade talks, Taiwan’s Deputy Economy Minister Chen Chern-chyi straightforwardly hinted that upgrading relations commensurate to Taipei’s connections with Washington “would be very helpful for our companies for their attention towards and knowledge of Europe.”<sup>60</sup> Though the pandemic and chip supply chain crisis has allowed Taipei to shore up more political support within Europe, it is yet to be translated into concrete results at the EU level, where it continues to operate within the internally

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contested confines of the One-China Policy. Even the June high-level trade talks could not veil that the ambitious European rhetoric– and Taiwan’s insistence on the talks being a “major breakthrough”<sup>61</sup> – were not followed up by any detailed road map. Nevertheless, President Tsai has seemingly become more assertive in her reiterated requests for the EU to make headway on the stalling negotiations for a potential Bilateral Investment Agreement (BIA),<sup>62</sup> first initiated in 2016.

As of July 1, the Czech Republic, one of the EU’s most outspoken supporters of Taiwan, holds the EU Council presidency for the next six months. Over the past year, numerous Czech politicians have come out in support of Taiwan after Beijing sanctioned Lithuania for inching closer to Taipei. Among them is Prime Minister Petr Fiala, who in January 2022 seconded his government’s four-year plan to foster ties with Asian democracies, including Taiwan, likely influencing the presidency’s agenda.<sup>63</sup> One of the Czech Presidency’s top five priorities is enhancing the EU’s “strategic resilience,” including boosting technological competitiveness and deepening trade with democratic nations.<sup>64</sup> However, it remains to be seen how this priority will compete for attention amid the multiple crises currently rocking the Union. Following U.S. House speaker Nancy Pelosi’s contentious visit to Taipei in early August 2022, HR/VP Borrell notably clarified the EU is trying to “act as a moderator” in the Taiwan Strait, defending the current strategy of strategic ambiguity on Taiwan. When asked, Borrell said he had no plans for visiting Taipei, as to avoid providing China “a pretext for tensions to grow.”<sup>65</sup> Nevertheless, Marie-Pierre Vedrenne, a French member of the European parliament, has pledged a visit to Taiwan by a parliamentary trade committee will go ahead as planned in December 2022.<sup>66</sup>

### Looking Ahead

In the long-term, closer cooperation between the EU and Taiwan on semiconductors will have to be preceded by more realistic expectations. For Taiwan, this includes remembering that the EU’s institutional

complexity and diversity may not translate newfound interest into any immediate policy changes toward the self-governing island. While the European Parliament has become increasingly vocal in its support for Taiwan, both in resolutions and delegation visits, Common and Foreign Security Policy (CFSP) matters are agreed upon by unanimity voting, and there seems to be little desire among member-states to upend the status quo. Meanwhile, Brussels will have to err on the side of caution and temper its expectations concerning cutting-edge semiconductors, assuaging the skepticism motivated by prior shortfalls in industrial policy, unlikely to be lost on Taiwanese business delegations. Clearing the way for further Taiwanese investments in Europe will depend on Brussels' ability to move from rhetorical commitments to feasible and economically sound action plans.

Nevertheless, much of the EU's current policy on Taiwan appears overly reactive. While Taiwanese tech giants are looking for investment opportunities abroad, it would be overly simplistic to assume they are desperate for opportunities. As such, the EU would ideally invest in understanding both Taipei's and TSMC's priorities. Just as TSMC is lukewarm about costly mega investments with uncertain profitability, the Taiwanese government seems to prefer a steady stream of smaller yet successful cooperation projects that guarantee long-term engagement.<sup>67</sup> Taipei has carefully observed and learned from the fallout of China's underperforming '17+1' grouping (now 14+1) and, frankly, lacks the same financial resources with which Beijing courted engagement. Brussels' industrial policy revision is a positive start, albeit one still plagued by past pitfalls, uncertain commitment, and ad hoc attempts to court Taipei.

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