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Fabio Bulfone, Donato Di Carlo,
Filippo Bontadini, Valentina Meliciani

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Adjusting to new geopolitical realities: semiconductors industrial policy in the US and EU

Fabio Bulfone, assistant professor, Leiden University (f.bulfone@fgga.leidenuniv.nl)
Donato Di Carlo, lecturer, Luiss Hub for New Industrial Policy (ddicarlo@luiss.it)
Filippo Bontadini, assistant professor, Luiss University Guido Carli (fbontadini@luiss.it)
Valentina Meliciani, full professor, Luiss University Guido Carli (vmeliciani@luiss.it)

Abstract

After analysing strengths and weaknesses in the United States and European Union's digital value chains, this paper compares these countries' industrial policy strategies in the semiconductor industry. We study the characteristics of the US CHIPS Act and the EU Chips Act by analysing the protagonists, objectives, instruments, conditionalities, and beneficiaries of these industrial policy initiatives. The EU has major vulnerabilities across the entire value chain. The United States is in a stronger position, but it is increasingly challenged by China's fast expanding capabilities. Both industrial policy initiatives focus predominantly on boosting the capacity for intermediate products. The United States employs a centralized model, with robust funding for direct subsidies and stringent conditionalities, including on labour standards and domestic production mandates. Conversely, the European Union relies on a decentralized approach where the European Commission operates mostly as an orchestrator of cross-country and cross-sectoral production networks. A primary role is assigned to member states which provide targeted funding to firms under the framework of the Important Projects of Common European Interest. The EU's conditions are notably less stringent, which may impact the effectiveness of its strategy. The analysis highlights the EU's need for increased supranational funding for digital industrial policy to strengthen its position between global leaders and emerging powers.

1. Introduction

In this paper, we provide a comparative analysis of the major industrial policies for the semiconductor industry by the United States (US) and the European Union (EU) over the past five years – a period that has witnessed growing industrial policy activism, accelerating a dynamic that dates back to the global financial crisis. While industrial policy was already being practiced on both sides of the Atlantic before, this period marked by the Covid pandemic and the incumbency of the Joe Biden Administration in the United States was a turning point both in terms of the *discourse* on industrial policy and the *scale* of government intervention.[1]

This renewed state activism has been driven by growing geopolitical tensions and their increasing interpenetration with economic dynamics. The rise of China as a global political and economic superpower and growing tensions between the United States and the EU, especially during the Donald Trump Administration, have put the issue of strategic autonomy high on the agenda of policymakers on both sides of the Atlantic. While an analysis of the motives behind this new state activism is beyond the scope of this paper, we aim to provide a preliminary and largely descriptive comparative analysis of the industrial policy efforts of the United States and the EU, with a particular focus on the semiconductor industry – a crucial subset of digital industrial policies which, along with green industrial policy, have been the main strategic concern of policymakers. For the sake of brevity, we focus on the main industrial policy interventions in the semiconductor sector implemented in the United States and the EU: the US Chips and Science Act (US CHIPS) and the EU Chips Act.

Our analysis is divided into two main parts. In section two, we rely on trade data for the period up to 2021 to map the strategic *strengths* and *weaknesses* of the United States and the EU in the semiconductor value chain and highlight the challenges the two blocs face in designing their industrial policy interventions. We focus on the value chains of computers and communication equipment, considering strategic minerals and components and looking at import dependencies of the EU[2] (also with a specific focus on Germany and Italy) and United States in comparison with China over the period 2011-2021. In section three, we compare the industrial policy plans adopted by the United States and the EU along five dimensions identified as crucial in the industrial policy literature: *protagonists* (the main actors carrying out the industrial policy effort), *goals*, *size/financial commitment*, type of *policy instruments* used (e.g. subsidies, tax benefits or other forms of incentives), and the forms of *conditionalities* attached to public support. We also provide a tentative analysis of the main beneficiaries, that is, firms and (member) states, reaping the benefits of these two policies in terms of new investment plans and job creation.

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[1] Bulfone, F. (2023). Industrial policy and comparative political economy: a literature review and research agenda. Competition & change, 27(1), 22-43.

[2] EU 27 as of 2020 including Croatia but not the UK.

2. The status quo ante: Strengths and weaknesses of the US and EU semiconductors value chains compared

In this section we use trade data to measure the import dependencies of EU (here referred to as Europe) and United States at the different stages of the digital value chain in 2011 and 2021. For comparison, we also report the same figures for China and for the two largest manufacturing European countries: Germany and Italy. Data comes from the BACI-CEPII database,[3] which provides harmonised trade data from UNCOMTRADE. The selected products are based on a recent study commissioned by the European Parliament's Committee on Industry, Research and Energy.[4] The study provides groupings of harmonised (HS) codes[5] linked to products relevant for the green transition and decarbonisation, which we have expanded with an eye to including the digital transition. To identify a subset of the relevant critical raw materials we have relied on insights from the SCCREEN3 Horizon Project,[6] coordinated by the French *Bureau De Recherches Geologiques Et Minieres* (BRGM). To operationalise the various stages of the value chain, we include basic minerals that are strategic for the digital value chain at the *mining* stage (Copper, Cobalt, Gallium and Rare Earths) and at the *refining* stage (Copper, Cobalt and Silicon); the *strategic components* that are used to produce ICT goods (Microchip machineries, Optical fibres, Wafers and Microchips) and the *final goods* (Computers and Communication equipment).

Based on data in Figure 1, Europe displays notable dependencies at all stages of the value chain. At the mining stage, Europe is dependent on the imports of copper ore, and gallium and rare hearts. At the refining stage, Europe's dependencies include copper and cobalt. Moreover, despite the attention and monitoring of critical raw materials,[7] these dependencies have not changed over the decade 2011-2021. At the stage of the components, where the interconnection between production capabilities and technological development creates important synergies, Europe has a strong advantage only in the production of microchips machineries, while it is a net importer of optical fibres and microchips, with a dependence that has increased over the period 2011-2021. At the final stage of the value chain, Europe is a net importer of both computers and communication equipment, and the net dependence is growing over time.

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[3] http://www.cepii.fr/cepii/en/bdd_modele/bdd_modele.asp.

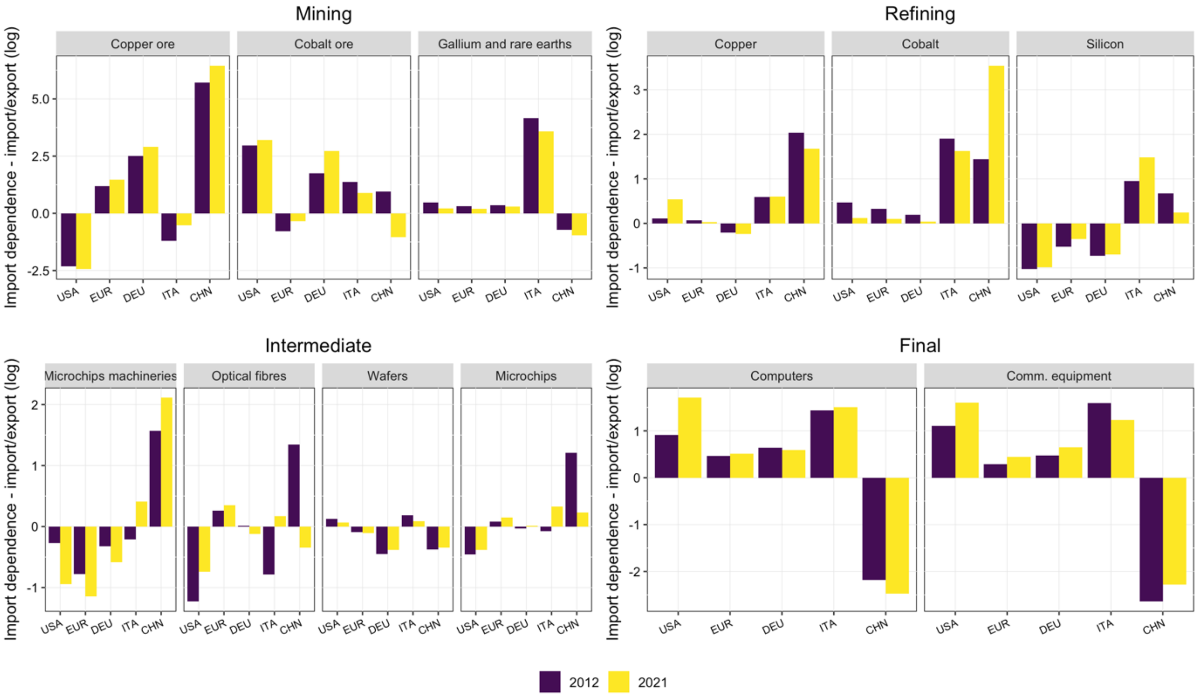
[4] Rietveld, Elmer, Ton Bastein, Twan van Leeuwen, Sara Wieclawska, Noortje Bonenkamp, David Peck, Magdalena Klebba, Marie Le Mouel, and Niclas Poitiers. Strengthening the security of supply of products containing Critical Raw Materials for the green transition and decarbonisation. European Parliament, 2022.

[5] Harmonised System (HS) Codes are commonly used throughout the export process for goods. The Harmonised System is a standardised numerical method of classifying traded products. It is used by customs authorities around the world to identify products when assessing duties and taxes and for gathering statistics.

[6] See: https://scrreen.eu/the-project/.

[7] EU initiatives on critical raw material initiatives date back to 2008. The EU has produced various lists of critical materials in 2011, 2014, 2017, 2020 and 2023.

***Figure 1*: key dependencies in the digital value chain as of 2011 and 2021. Values above zero indicate a net import, i.e. a measure of dependence in the relevant good.**



Source: Authors' elaborations on BACI-CEPII data.
Note: The figure reports the natural logarithm of the ratio of imports over exports for the years 2011 and 2021.

Overall, with the notable and important exception of machineries, where Europe plays a leading role, the position in the digital value chain appears critical and calls for policymakers' attention and the rethinking of effective industrial policies. Thus, Europe's strengths along the digital value chain can be found at the intermediate stage, with Germany being a net exporter of machineries for microchips and wafers. Italy used to be a next exporter of machineries for microchips and optical fibres in 2011, but as of 2021 has turned into a net importer, while Germany has improved its trade balance between 2011 and 2021.

When looking at the Unites States, one detects important dependencies across the various stages of the chain, although the position appears less critical than that of Europe. In the case of the minerals, the United States is a net importer of cobalt ore, gallium and rare earths but it has a trade advantage in copper ore. At the refining stage, the United States enjoys a strong advantage in silicon. When looking at the stage of intermediate components, the United States is positioned much better than Europe with strong advantages in optical fibres, microchips and microchips machineries but a trade dependence for the import of wafers. However, over time, the advantage of the United States in optical fibres and microchips had eroded. At the final stage of the digital value chain, the United States is a net importer of both computers and communication equipment and import dependencies have substantially increased between 2011 and 2021. Thus, although its leadership has been gradually eroding, the United States is still a dominant actor along the digital value chain, accounting for 46 per cent of the global trade in semiconductors. The EU is a less central player accounting for less than 10 per cent of global trade, instead.[8] While the United States hosts many global leaders in the design segment like Qualcomm, Nvidia and Intel, none of the ten largest global producers resides in the EU.

While having import dependencies in both microchip machineries and in microchips, China dominates the market for final goods, with marked trade surpluses in computers and communication equipment. At the intermediate stage, China has improved substantially its position in optical fibres (where it became a net exporter) and in microchips (where it is still a net importer but increasingly less so) while it still exhibits a strong dependence in the microchip machinery sector.

Table 1: **overview of critical dependencies in Europe and the US, vis-à-vis selected other countries**

	Mining	Refining	Intermediate Products	Final Products
European Union	Copper ore, Gallium & Rare Hearts	Copper, Cobalt	Optical Fibres, Microchips	Computers, Communication Equipment
United States	Cobalt ore, Gallium & Rare Hearts	Copper, Cobalt	Wafers	Computers, Communication Equipment
Germany	Copper ore, Cobalt ore, Gallium & Rare Hearts	Cobalt	-	Computers, Communication Equipment
Italy	Cobalt ore, Gallium & Rare Hearts	Copper, Cobalt, Silicon	Microchips Machineries, Optical Fibres, Wafers, Microchips	Computers, Communication Equipment
China	Copper ore	Copper, Cobalt, Silicon	Microchips Machineries, Microchips	-

Source: own elaboration based on data from figure 1.

Overall, Europe displays notable vulnerabilities across all the stages of the digital value chain. Nevertheless, the EU can still rely on some strengths, particularly in the production of manufacturing equipment, Artificial Intelligence (AI) chip design, as well as research and development (R&D) investment,[9] and a non-negligible productive capacity in less advanced chips used for the car-making sector, with important players like STMicroelectronics. At the same time, the United States' previous strength is increasingly challenged by China's rapid expansion of key capabilities along all stages of the digital value chain. Such developments justify policymakers' attention, across both sides of the

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[8] Poitiers, N. F., & Pauline, W. E. I. L. (2022). Fishing for Chips: Assessing the EU Chips Act. Briefings de l'Ifri, July 8, 2022. Available at: https://www.ifri.org/en/publications/briefings-de-lifri/fishing-chips-assessing-chips-act.

[9] Hancké, B. & Garcia Calvo, A. (2022) Mister Chips goes to Brussels: On the Pros and Cons of a Semiconductor Policy in the EU. Global Policy, 13, 585–593. Available from: https://doi.org/10.1111/1758-5899.13096.

Atlantic toward industrial policy initiatives aimed at strengthening strategic autonomy in the digital value chain.

In what follows, we focus on the European Union and the United States' Chips acts as the major industrial policies aimed at strengthening manufacturing and technological capabilities in the digital realm. To do so, we consider the two initiatives in the context of broader dynamics characterising the semiconductors industry and changes within the geopolitical context.

3. Comparing the US Chips and EU Chips Act

3.1 The Semiconductor industry: some descriptive features

Semiconductors are a key input in many strategic industries, "the building blocks of current and future infrastructures and applications including 5G/6G telecommunications networks, smart energy production and distribution networks, transportation systems, supercomputing, cloud computing, and AI"[10] As a central pillar of the digital transition, semiconductors are also "powerful enablers" of the green transition, being for instance a key component of electric car engines.

Two features characterise the semiconductors supply chain. First, production requires very high fixed costs and R&D investments. According to some estimates, building a state-of-the-art production facility can cost on average €20 billion.[11] Second, the semiconductor market has historically been characterised by frequent boom-and-bust cycles, with periods of high demand followed by long stints of overcapacity. These two features have led to an extremely high level of market concentration, with few players controlling each phase of the supply chain. US companies have a dominant position in the design phase, controlling 65 per cent of the market.[12] Production of advanced semiconductors is dominated by Taiwan's TSMC, which accounts for 92 per cent of the total productive capacity. However, TSMC depends on the Dutch ASML for the supply of high-end chip manufacturing machines – while also Germany (and Italy to a much lesser extent) exhibits strong capabilities in the production of machineries for microchips (Figure 1).

The presence of bottlenecks along the supply chain due to high concentration, coupled with the growing demand for semiconductors, has led to severe supply-chain disruptions during and after the COVID-19 pandemic, particularly in the automotive sector.[13] Supply-chain tensions are further aggravated by the fact that a large share of the global productive capacity is located in Taiwan, a

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[10] *Ibidem*, p. 589.

[11] *Ibidem*, p. 589.

[12] Poitiers, N. F., & Pauline, W. E. I. L. (2022). Fishing for Chips: Assessing the EU Chips Act. Briefings de l'Ifri, July 8, 2022. Available at: https://www.ifri.org/en/publications/briefings-de-lifri/fishing-chips-assessing-chips-act.

[13] *Ibidem*.

Western partner under threat of Chinese invasion.[14] The growing strategic importance of semiconductors has led many advanced economies including the United States, China, South Korea, Japan and the EU to implement ambitious plans of targeted funding in support of the semiconductor industry. The US CHIPS and the EU Chips Act analysed here should be seen in the context of this global subsidy race.

3.2 The politics of the US and EU industrial policies

Moving from the global context to issues related to domestic politics, the political circumstances that have led to the approval of the two acts were similar. However, the timing of the two measures differs, with the EU Chips Act enacted as a direct response to the US CHIPS Act.

The US CHIPS Act stands out as one of the few bills that gathered bipartisan support, including a 60 per cent majority in the Senate, amid great polarisation between the Democratic and the Republican Party. This rare agreement shows how industrial policy is one of the few common denominators between the developmentalist platform promoted by the Democratic Party under Biden and the protectionist policy championed by "Make America Great Again" Republicans.[15] The emergence of China as a new global rival, and the ensuing geopolitical tensions, have played a decisive role as a coalitional magnet, as the US CHIPS Act was mainly conceived to counter Chinese investment in the sector as part of the Made in China 2025 strategy.[16]

In the EU, a political alignment in favour of supporting the semiconductors industry emerged at a later stage. In fact, until 2019 the Commission was still supporting multilateral trade solutions. It was only after the aggravation of the geopolitical tensions between China and Taiwan, and the outbreak of the war in Ukraine, that an alignment within the Commission and the Council emerged in favour of an industrial policy intervention. The discussion and later approval of the US CHIPS and the Inflation Reduction Act (IRA) in the United States has played a decisive role in favouring this dynamic, as EU authorities and member states agreed on the need to respond to the alleged attempts by the US government to lure EU companies and talents to America. Despite the emergence of such a political coalition, deep divisions still exist within the Council and the Commission on the extent to which an industrial policy action is needed in the sector. Most notably, while the French government supports the protection of domestic companies to achieve strategic autonomy, Germany seems more reluctant

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[14] Donnelly, S. (2023). Semiconductor and ICT Industrial Policy in the US and EU: Geopolitical Threat Responses. Politics and Governance, 11(4), 129-139. doi: https://doi.org/10.17645/pag.v11i4.7031.

[15] Donnelly, S. (2024). Political party competition and varieties of US economic nationalism: trade wars, industrial policy and EU-US relations. Journal of European Public Policy, 31(1), 79–103. https://doi.org/10.1080/13501763.2023.2226168

[16] *Ibidem*.

to call multilateral trade into discussion.[17] These enduring divisions are reflected in the very limited common budgetary resources allocated in support of the EU Chips Act. With this political background in mind, we can now turn to a more detailed analysis of the two pieces of legislation.

3.3 The US CHIPS: Goals, main elements, funding and preliminary beneficiaries

Approved in summer 2022, the US CHIPS and Science Act explicitly aims at helping the United States restore its leadership in the manufacturing of advanced semiconductors, thereby reducing dependence on foreign countries along the supply chain.[18] The bill involves a financial commitment of $ 52.7 billion by the US government, of which $39 billion to subsidise domestic facilities for the production, assembly and packaging of semiconductors, and $13.2 billion for the financing of research and development facilities. To this, the bill adds a 25 per cent tax credit for investments in semiconductor manufacturing, as well as measures to speed-up permitting procedures.[19]

In general, the US CHIPS Act stands out for its centralised structure. Funding comes entirely from the federal government, whereby the administration plays a leading role in selecting investment priorities. This centralised structure makes the distribution of funds relatively rapid.

In terms of beneficiaries, preliminary data allows for some tentative observations concerning the main companies who have *announced* new investments benefiting from the CHIPS' tax credits and other incentives (Figure 2), the US states in which these investments will be located (Figure 3, panel A) and the expected employment repercussions (Figure 3, panel B).

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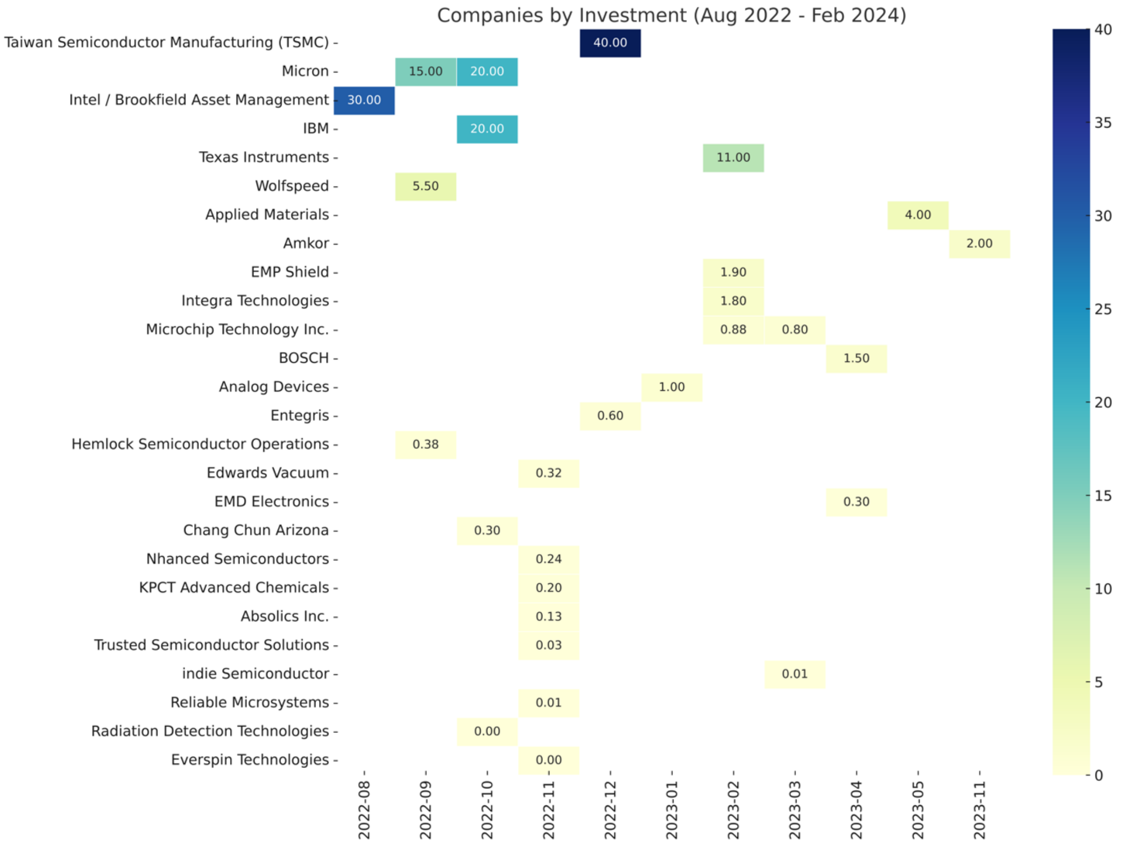
[17] For a reconstruction of these political dynamics, see Donnelly, S. (2023). Semiconductor and ICT Industrial Policy in the US and EU: Geopolitical Threat Responses. Politics and Governance, 11(4), 129-139. doi: https://doi.org/10.17645/pag.v11i4.7031.

[18] Donnelly, S. (2023). Semiconductor and ICT Industrial Policy in the US and EU: Geopolitical Threat Responses. Politics and Governance, 11(4), 129-139. doi: https://doi.org/10.17645/pag.v11i4.7031.

[19] White House. (2022). FACT SHEET: CHIPS and Science Act Will Lower Costs, Create Jobs, Strengthen Supply Chains, and Counter China. August 9, 2002. Available at: https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/09/fact-sheet-chips-and-science-act-will-lower-costs-create-jobs-strengthen-supply-chains-and-counter-china/.

Figure 2: **Chips and Science Act manufacturing investment *__announcements__* by company and by size of the investment in $ billion (August 2022 – February 2024)**



Source: own elaboration based on data from the Jack Conness IRA – Chips act database.[20]

Between August 2022 and February 2024, twenty-eight investment announcements were recorded across the United States in relation to the CHIPS Act. The Taiwanese semiconductor champion TSMC had announced the largest investment – $40bn – in December 2022. As of early April 2024, TSMC has announced to further expand its investment to up to $65bn to build a fabrication plant in Phoenix where to produce cutting-edge chips, benefitting from government support worth $6.6bn in grants and up to $5bn in loans.[21] Other major investment announcements have come from US technology and semiconductors firms such as Micron Technology for a total of 35bn, Intel for $30bn, IBM for 20bn, Texas Instruments for $11bn, Wolfspeed for $5.5bn, and Applied Materials for $4bn. Thus, overall, apart from TSMC (and the German multinational Bosch), it is mostly American firms that responded to the CHIPS Act.

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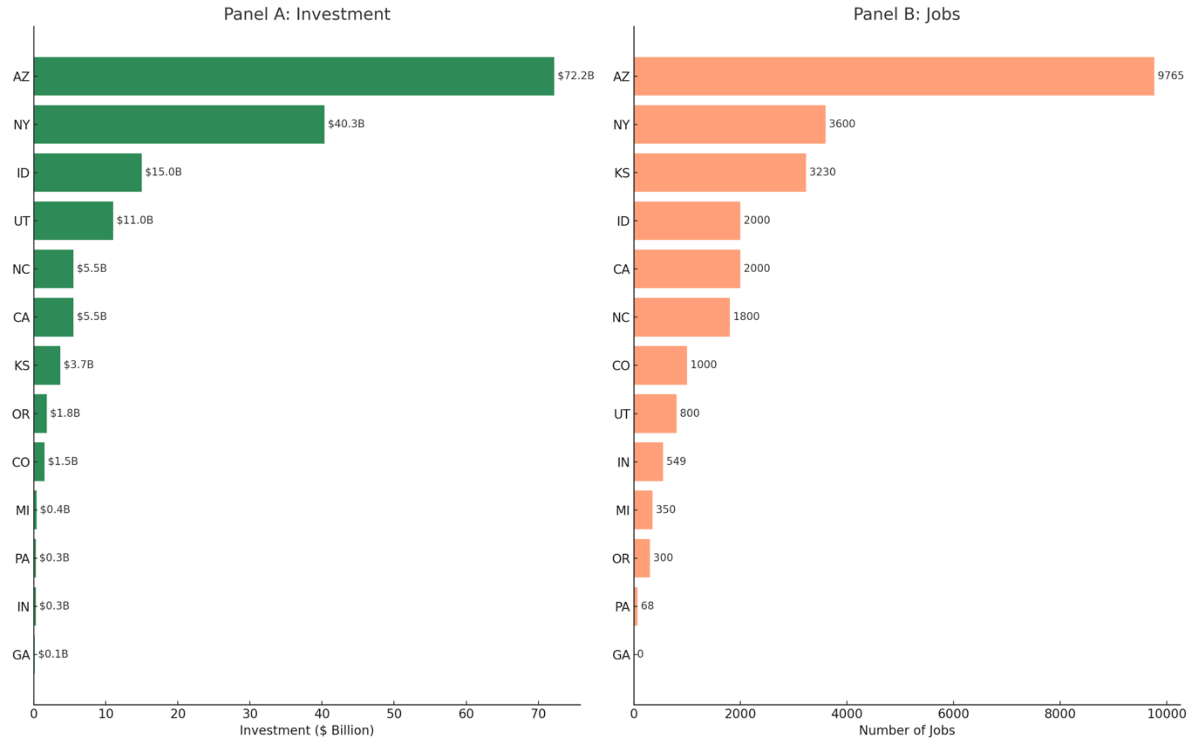
[20] Available at: https://www.jackconness.com/ira-chips-investments.

[21] *Financial Times*, April 8, 2024, TSMC boosts Joe Biden's AI chip ambitions with $11.6bn US production deal, available at: https://www.ft.com/content/4798ab77-e063-4784-bdf3-19852b41fd1f

Figure 3: **Investment (in $bn) and jobs generated in relation to the CHIPS Act in the different US States (August 2022 – February 2024)**



Source: own elaboration based on data from the Jack Conness IRA – Chips act database.[22]

Regarding the geographical distribution of investments and the forecasted job creation (Figure 3), the largest recipient of both investments and expected job creation has been Arizona, by far, followed by New York state. In terms of investment attraction, notable beneficiaries have also been Idaho, Utah, North Carolina, California and Kansas. With regard to jobs, other major beneficiaries have so far been Kansas, Idaho, California and North Carolina.

3.4 The EU Chips: Goals, main elements, funding and preliminary beneficiaries

Adopted in 2023, the EU Chips Act Regulation has the main goal to strengthen the "competitiveness" and "resilience" of the EU by addressing the "strategic dependencies" in the design and production of all types of semiconductors (Chips Act Regulation)[23]. Hence, like in the United States, the initiative was explicitly framed in relation to the achievement of "strategic autonomy."[24] To do so, the EU Chips

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[22] Available at: https://www.jackconness.com/ira-chips-investments.

[23] Regulation (EU) 2023/1781 of the European Parliament and of the Council of 13 September 2023 establishing a framework of measures for strengthening Europe's semiconductor ecosystem and amending Regulation (EU) 2021/694 (Chips Act). Available at:

https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2023.229.01.0001.01.ENG.

[24] European Commission. (2023). European Chips Act - Questions and Answers. Brussels, 30 November 2023. Available at: https://ec.europa.eu/commission/presscorner/detail/en/qanda_23_4519.

Act concretely aims at increasing the global share of semiconductor production of the EU from 10 to 20 per cent by 2030. Since the industry has been rapidly expanding, some estimates have indicated that meeting this objective would require quadrupling the current productive capacity – a goal deemed excessively ambitious given the EU's current position in the market.[25]

The EU Chips Act has three pillars. The first pillar centres on research, development and innovation; the second includes measures to facilitate the development of semiconductor manufacturing plans (foundries); the third sets up a system to monitor and address supply chain crises.[26]

The first pillar brings together existing schemes to financially support research and development of semiconductors, like Horizon Europe, under the umbrella of the *Chips for Europe Initiative*. These projects are already considered quite successful, reflecting one of the strengths of the EU in the semiconductors value chain.

The second pillar aims at broadening the production capacity of the EU for both leading-edge and mature chips by attracting (mainly foreign direct) investment.[27] To do so, the EU Chips Act gives member states the possibility to grant subsidies to companies willing to open new semiconductor foundries in the EU. Member states are also authorised to provide administrative support in the form of fast-tracking of permit granting procedures. If the Commission approves the plans presented by the member states, designated foundries can receive this support in derogation to the State Aid regime.[28]

The third pillar involves the establishment of a coordination system between the Commission and the member states tasked with monitoring the semiconductor supply chain anticipating future shortages.[29] Crucially, as shown in detail in the following section, according to this scheme, during supply chain emergency situations the Commission could impose conditionalities to companies that had received financial and administrative support in the framework of the second pillar, as well as setting up joint procurement systems.

In terms of the funding structure, the Commission envisaged a funding of €43 billion for the EU Chips. However, this funding is only *forecasted,* meaning that the Commission expects this sum to be generated by combining funding from the EU budget, the budget of the member states and private companies. In particular, the Commission expects public investments from the EU and the member states to amount to €11.2 billion, with €32 billion coming from private investors. If we look at the

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[25] Hancké, B. & Garcia Calvo, A. (2022) Mister Chips goes to Brussels: On the Pros and Cons of a Semiconductor Policy in the EU. Global Policy, 13, 585–593. Available from: https://doi.org/10.1111/1758-5899.13096.

[26] For an overview, see Poitiers and Weil (2022).

[27] European Commission. (2023). European Chips Act - Questions and Answers. Brussels, 30 November 2023. Available at: https://ec.europa.eu/commission/presscorner/detail/en/qanda_23_4519.

[28] *Ibidem*.

[29] *Ibidem*.

actual funding from the EU budget, which is the most direct comparator of the funding from the budget of the US federal government, this should amount to a mere €3.3 billion, mostly coming from the repurposing of existing funding streams.[30] For their part, member states are expected to provide funding independently in the framework of the second pillar, or in common projects established using the instrument of the Important Projects of Common European Interest (IPCEIs).

The difference in the funding structure of the EU and US Chips Acts highlights one of the main limits of the EU's industrial policy effort, at least when it comes to targeted funding. Lacking own fiscal authority, the Commission is forced to rely on member states' funding for national subsidies, as opposed to the United States' centralised provision of fiscal subsidies.[31] Although member states still depend on the Commission for the approval of their funding plans, the Commission remains evidently limited in its capacity to set up and follow up on its industrial policy priorities. Furthermore, given EU countries' varying fiscal capacity, leaving the task of supporting strategic industries to the member states is poised to exacerbated existing economic inequalities and jeopardise the European single market.

This complex funding structure and the multi-level governance of the EU's industrial policy makes it difficult to identify the main beneficiaries of the EU Chips Act, due to the lack of a direct comparator. We thus briefly focus only on the IPCEI instrument, which has become a major vehicle for the EU to steer its industrial policy.[32] In relation to the EU Chips Act, in June 2023, the European Commission approved under EU state aid rule the IPCEI in microelectronics and communication technologies (IPCEI ME/CT).[33] The project aims to enable Europe's digital and green transformation by creating innovative microelectronics and communication solutions and by developing energy-efficient and resource-saving electronics systems and manufacturing methods.[34] The IPCEI ME/CT comprises 68 projects run by 56 companies[35] and thirty associated partners including universities and research organisations across 180 cross-border collaborations. It envisages the participation of fourteen member states[36] providing €8.1bn in public funding, with the expectation that an additional €13.7bn will be unlocked in private investment. Moreover, the projects covered by the IPCEI ME/CT include a

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[30] Donnelly, S. (2023). Semiconductor and ICT Industrial Policy in the US and EU: Geopolitical Threat Responses. Politics and Governance, 11(4), 129-139. doi: https://doi.org/10.17645/pag.v11i4.7031.

[31] Poitiers, N. F., & Pauline, W. E. I. L. (2022). Fishing for Chips: Assessing the EU Chips Act. Briefings de l'Ifri, July 8, 2022. Available at: https://www.ifri.org/en/publications/briefings-de-lifri/fishing-chips-assessing-chips-act.

[32] Eisl, A. 2022. "EU industrial policy in the making. From ad hoc exercises to key instrument: how to make IPCEIs fit for the long run", Policy paper, Paris: Jacques Delors Institut , 16th December.

[33] A first IPCEI on microelectronics had been launched already in 2018 and predates the EU Chips Act. See: https://competition-policy.ec.europa.eu/state-aid/ipcei/approved-ipceis/microelectronics-value-chain_en

[34] See: https://competition-policy.ec.europa.eu/state-aid/ipcei/approved-ipceis/microelectronics-value-chain_en.

[35] For the detailed list of all the companies involved in the IPCEI ME/CT, see: https://ec.europa.eu/commission/presscorner/detail/en/IP_23_3087.

[36] Austria, Czechia, Finland, France, Germany, Greece, Ireland, Italy, Malta, the Netherlands, Poland, Romania, Slovakia and Spain.

claw-back mechanism whereby firms' whose successful projects generate extra net revenues are mandated to return part of the aid received to the respective member state. Thus, while the industrial policy role of the US government is increasingly to shape the semiconductor sector through centralised governance and targeted funding directly available to single firms, the EU Commission increasingly operates as an "orchestrator" of industrial policy by facilitating the provision of national state aid by member states and by incentivising the emergence of cross-country and cross-sectoral production networks in the single market.[37]

3.5 Conditionality in the US CHIPS Act

According to prominent industrial policy scholars, targeted funding like that envisaged by the US CHIPS Act and the EU Chips Act can only yield positive societal impact when the transfer of financial resources from the public to the private sector is conditional to the fulfilment of public goals by private actors.[38] This engagement typically comes in the form of contractual relationships based on conditionalities.[39]

In the case of the US CHIPS Act, the financial support to private companies comes with important conditionalities related to domestic production and employment targets. In fact, the US CHIPS Act forbids companies receiving financial support from expanding or building manufacturing capacity for certain advanced semiconductors in countries that represent a national security threat to the United States. The Biden Administration designed this measure with China in mind, and with the support of the Republican opposition.[40] The US CHIPS Act also features some redistributive conditions. For instance, recipients of federal funding must meet conditions related to the respect of labour standards and an obligation to offer adequate salary levels and are forbidden to use federal funds for share buybacks or dividends. Companies are also required to share profits exceeding a certain threshold with the federal government. The US CHIPS Act gives the federal government instruments to monitor the fulfilment of agreed goals, with the possibility to suspend or clawback funding.[41]

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[37] For a broader discussion of the European Commission role as facilitator of industrial policy in the single market, including by means of the IPCEIs, see Di Carlo and Schmitz (2023).

[38] Amsden, A. H. (2001). The rise of" the rest": challenges to the west from late-industrializing economies. Oxford University Press, USA.

[39] Mazzucato, M. and Rodrik, D. (2023). Industrial Policy with Conditionalities: A Taxonomy and Sample Cases. UCL Institute for Innovation and Public Purpose, Working Paper Series (IIPP WP 2023-07). Available at: https://www.ucl.ac.uk/bartlett/public-purpose/wp2023-07.

[40] Donnelly, S. (2024). Political party competition and varieties of US economic nationalism: trade wars, industrial policy and EU-US relations. Journal of European Public Policy, 31(1), 79–103. https://doi.org/10.1080/13501763.2023.2226168.

[41] For an overview, see NIST. (2023) Notice of Funding Opportunity: Commercial Fabrication Facilities. National Institute of Standards and Technology, U.S. Department of Commerce. Available at: https://www.nist.gov/chips/notice-funding-opportunity-commercial-fabrication-facilities.

3.6 Conditionality in the EU Chips Act

Since most of the public funding is distributed by the member states, the Commission has less leeway to introduce and enforce conditionalities when compared to the US government in the US CHIPS Act. However, the bill still features some conditionalities. If a group of countries opts to provide targeted subsidies to semiconductor companies as part of an IPCEI, they are required by the Commission to set-up a profit-sharing mechanism (claw-back mechanism) to make sure that companies redistribute extra profits obtained thanks to public funding to their financers. The other conditionalities included in the EU Chips Act are activated in case the Commission and the member states certify a situation of supply chain crisis under the third pillar. In this case, the Commission can ask foundries that had received support in the framework of the EU Chips Act to share information about their production capacities and, when deemed necessary, give priority to domestic orders of critical products. If companies refuse to fulfil these requirements, the Commission can impose fines or other forms of penalty payments.

4. Concluding reflections

This paper has analysed the strategic dependencies of the United States and the EU in the digital value chain, and the two major industrial policy initiatives launched there to strengthen strategic autonomy and productive capabilities in the semiconductor industry. The EU has major vulnerabilities across the entire value chain. The United States is in a stronger position, but its resilience is far from granted, as China is fast catching up in the early stages of the digital value chain (table 1 and figure 1 above) – while being already dominant in final goods. In this respect, the United States and China are clearly fighting for global supremacy. The EU is caught between a rock and a hard place, and how and whether it will successfully manage to carve out is role in this global competition appears less clear.

Our brief analysis of the US CHIPS and the EU Chips Acts reveals some important elements for comparison. Both legislations focus predominantly on the third stage of the digital value chain, namely boosting the capacity for intermediate products. For the import of critical raw materials, the EU is highly dependent on extra-EU countries in the mining and refining stages of the value chain – an issue it is trying to address with the Critical Raw Materials Act (CRMA).[42] At the intermediate stage of the value chain, both the United States and the EU have some strengths. However, in the case of the EU, they are mostly concentrated in machineries (figure 1). This makes industrial policy interventions promising in both trading blocs. Given the complexity of the value chain, industrial

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[42] Proposal for a regulation of the European Parliament and of the Council establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) 168/2013, (EU) 2018/858, 2018/1724 and (EU) 2019/102. Available at: https://single-market-economy.ec.europa.eu/publications/european-critical-raw-materials-act_en

policy efforts should prioritise the areas of relative strength while trade policy and international agreements with developing countries are strategic toward ensuring access to critical minerals.

However, while the ambitions of the United States and EU are broadly similar, crucial differences remain (see Table 2 for a general overview). In terms of governance, the US industrial policy for semiconductors is highly centralised at the federal level, with generous funding coming directly from the federal budget. Instead, for the lack of its own fiscal capacity, the EU has adopted a decentralised approach, with very little EU funding (mostly targeted at R&D). Much of the industrial policy funding is expected to come either from the private sector or via member states' fiscal resources. Regarding the instruments to carry out industrial policy interventions, the United States has resorted to direct and targeted subsidies in the form of tax credits for manufacturing production in the semiconductor sector.

On the contrary, the EU strategy has been to carve out or repurpose regulatory flexibilities in the EU state aid regime, for example by incentivising member states to support strategic investment via the provisions of the IPCEI framework – and cajoling member states, firms and research institutions across the single market to cooperate in transnational production networks.[43] In terms of conditionalities, the US CHIPS Act imposes notable conditionalities in terms of domestic production for firms benefitting from public support, employment targets, profit-sharing and the respect of labour standards – as well as a prohibition to beneficiaries of tax credits to expand or build manufacturing capacities in rival countries. The EU Chips Act, too, imposes a claw-back mechanism for profit sharing and envisages the possibility for the European Commission to impose the prioritisation of European orders for semiconductors in times of supply chain crises – though these conditions are overall less encompassing than in the case of the United States.

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[43] See also Di Carlo, D., & Schmitz, L. (2023). Europe first? The rise of EU industrial policy promoting and protecting the single market. Journal of European Public Policy, 30(10), 2063-2096.

***Table 2:* comparative overview of the main characteristics of the US CHIPS Act and the EU Chips Act.**

	US Chips and Science Act	**EU Chips Act**
Protagonists	US Federal government (centralised governance)	European Commission & Member States (decentralised governance in multilevel polity)
Goals	Restore US' leadership in the manufacturing of advanced semiconductors, reduce foreign dependences in the digital value chain	Strengthen the EU's "competitiveness" and "resilience" by addressing the "strategic dependencies" in the design and production of all types of semiconductors, by increasing the EU's global share of semiconductor production from 10 to 20% by 2030
Financial Commitments	$52.7bn	€3.3bn (Expected leverage up to €43bn – combined investment by EU budget, member states and private sector)
Instrument types	Subsidies ($39bn), R&D facilities funding (13.2), tax credits on investments in semiconductor manufacturing, administrative simplifications	Financial support for semiconductors R&D, administrative simplifications, subsidies by EU Member States for foundries, monitoring mechanism to anticipate shortages and crises
Forms of conditionality	Domestic production, employment targets, profit-sharing, respect of labour standards	Claw-back mechanisms within IPCEIs, priority to EU orders in case of supply chain crises

Source: own elaboration.

Overall, the EU's gap vis-à-vis dominant players like the United States, Taiwan and China in some stages of the digital value chain is large and requires vigorous investments to regain some of the ground lost. The public funds so far invested by the EU and the member states are limited in relation to the ambitious targets, and there is no guarantee that enough private resources will effectively be mobilised. Moreover, member states have different technological capabilities and fiscal capacities. Therefore, without common EU resources, there is a serious risk of fragmentation of investment and of increasing disparities. To be effective, the new EU industrial strategy requires an increase in EU-wide funding, a strengthening of cross-country coordination in investment efforts, and the completion of the banking and capital markets union necessary to mobilise private funding.