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The geopolitics of supply chains: EU efforts to ensure security of supply

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Abstract

Recently, the EU launched a number of initiatives to prevent the weaponising of supply chains and build resilience against interruptions. This article explores attempts to ensure security of supply in three sectors: semiconductors, pharmaceuticals and critical raw materials. The analysis contrasts the measures taken in each sector in order to highlight commonalities and explain differences in approach and impact. This comparison of the EU's three principal policies for mitigating supply chain disruption shows the EU has equipped itself with more policy tools in the area of critical raw materials. The argument put forward to explain this prioritisation is that the weaponisation of critical raw materials has already taken place and risks stoking a political backlash against the EU green deal. Consequently, the evidence shows how the EU's geoeconomic hedging marks a move away from an overriding commitment to free markets as part of the postwar liberal international order. Rather, the EU is experimenting with market-directing mechanisms involving state aid, stockpiling and regulatory interventions in the name of security of supply. This change illustrates not just the fraying of the liberal international trade order but also the part that the EU is playing in this transformation.

1 | QUESTIONING THE RESILIENCE OF SUPPLY CHAINS IN THE LIBERAL INTERNATIONAL ORDER

In the early summer of 1939, with Europe again on the brink of war and Japan pursuing its invasion of China, the US Congress passed the Strategic and Critical Materials Stock Piling Act (US Congress, 1939). This law was designed to mitigate US reliance on foreign resources (both for military and civilian use) and supply chain disruption in the event of a looming geopolitical emergency. Post-1945 globalisation, in the form of just-in-time supply chains for manufactured goods and extensive international trade in associated raw material inputs, seemed for a time to have made stockpiling and associated types of geoeconomic hedging redundant. Reflecting the prevailing faith in the bounty of global trade, in 1997, the US Department of Defence

declared that 99% of its stockpiled critical materials were excess to their needs and proceeded to sell off this surplus worth several billion dollars (Department of Defense, 1998). Yet, a quarter of a century later, the question of security of supply in critical materials and industrial sectors such as pharmaceuticals or semiconductors has returned to the forefront of policymaking in the European Union as well as in the USA and East Asia.

The postwar intensification of international trade, a phenomenon that accelerated following the end of the Cold War, went hand-in-hand with the entrenchment of a US-dominated liberal international order (Ikenberry, 2009). As well as providing security in the form of alliances and a military footprint in various strategic regions, the United States oversaw the development of open trade, with the key exception of agriculture (Lloyd, 2001), and cooperation for mutual gain via the logic of comparative advantage. Though

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concerns surrounding hierarchy and even hegemony were never absent, the key tenet for global trade was the establishment of a system of trade rules enshrining principles of equality and reciprocity, as well as legalised dispute resolution, as encapsulated in the World Trade Organization (WTO) established in 1995 (Ikenberry, 2009).

In the context of this so-called rules-based liberal order, national economic power was still a force to be reckoned with in the form notably of market size, given this can influence pricing and provides the ability to set regulatory norms and withstand trade disputes. Hence, when the EU first began to engage with the issue of raw materials supplies for industry, it followed a market-creating approach that saw greater trade liberalisation as the solution to supply risks. When the European Commission launched its 2008 Raw Materials Initiative (RMI), it noted that ‘fundamental changes in global markets are threatening the competitiveness of European industry’ (European Commission, 2008, p. 4). This expression was shorthand for the rise of China and India, two countries whose consumption of raw materials and policies for sourcing them in third countries were starting to have notable market effects globally, especially in terms of price volatility. Indeed, it was in 2008 that China overtook the EU to become the world's largest importer of minerals (Tröster et al., 2017, p. 70). One objective of the RMI was the identification by the Commission of a list of 14 critical raw (non-energy and non-agriculture) materials in 2011, defined on the basis of the following criteria:

Critical raw materials are those which display a particularly high risk of supply shortage in the next 10 years and which are particularly important for the value chain. The supply risk is linked to the concentration of production in a handful of countries, and the low political economic stability of some of the suppliers. This risk is in many cases compounded by low substitutability and low recycling rates.

(European Commission, 2011, p. 12)

Ranging from antimony to tungsten, the list was subsequently revised upwards several times to 20 in 2014, to 27 in 2017, 30 in 2020 and 34 in 2023 (Cimprich et al., 2023). A key explanation for this increase is the role of critical raw materials in the technology crucial for transition to a low carbon economy: batteries for electricity storage, wind turbines and photovoltaic panels all rely on the supply chain in lithium, nickel and cobalt. Another component of the RMI was the call for an EU-led ‘raw materials diplomacy’ to secure access to such materials in third countries via EU trade, development and investment policy (European Commission, 2008),

a reflection of the geopolitical scramble for critical materials as the imperative of decarbonisation raised the stakes of security of supply. China, which dominates production and/or processing of numerous critical raw materials has also become their pre-eminent consumer as it rolls out a hugely ambitious energy transition programme of wind and solar power generation. For instance, China is responsible for 87% of global processing of rare earth elements that are key to the production of permanent magnets—a market 94% controlled by China—used in wind turbines or electric vehicles (Kamasa, 2023).

However, as this article argues, the EU's approach to ensuring resilient supply chains now comes in the form of policies that call into question Europe's adherence to a liberal international order privileging free markets and comparative advantage via universal and reciprocal trade rules. Brussels' strategy to address security of supply reflects European Commission President Ursula von der Leyen's desire, when taking office in 2019, to lead a ‘geopolitical Commission’ that would leverage the EU's economic heft in order to become more assertive in international affairs (Haroche, 2023). Indeed, a better label for this policy gambit is that of ‘geo-economics’ (Haroche, 2023,) as von der Leyen's overarching objective is to use the tools of economic diplomacy abroad and industrial policy at home to influence or respond to the changing international order alongside the imperative of managing the green transition. Under her presidency, the European Commission has launched three major policy initiatives to address security of supply in the shape of the EU Pharmaceutical Strategy, the CHIPS Act and the Critical Raw Materials Act.¹ It is these three policies that are analysed here, with a particular emphasis on critical raw materials as in this sector, the EU's recent legislation can be contrasted with over a decade of earlier policy initiatives.

Since these three security of supply policies target sectors closely linked to the proliferation of trade as part of the liberal international order, the article scrutinises the trade-offs associated with this strategy of ‘de-risking’ or ‘open strategic autonomy’ as the EU dubs it (Haroche, 2023). In particular, the analysis brings to light the political, and not just economic or regulatory, challenges of what experts label ‘geo-economic’ (Haroche, 2023) or ‘geo-dirigiste’ (Seidl & Schmitz, 2023) policymaking. The argument developed here demonstrates the growing tensions at the heart of EU decision-making between ensuring security of supply while simultaneously adhering to the principles of a liberal international order that was ‘not developed with the risk of catastrophic climate change in mind’ (Eckersley, 2023, p. 101). This is especially true in the field of critical raw materials, where the EU has been most active hitherto and where a transition from market-creating to market-directing can be identified. Ultimately, the evidence shows that in seeking to avoid strategic

dependencies, the EU is at risk of undermining the liberal international order that it has long sought to promote.

2 | FREE TRADE, SECURITY OF SUPPLY AND FEAR OF EU STRATEGIC DEPENDENCE

In many ways, the beginnings of European integration after 1945 can be read as a response to concerns about trade rules and security of supply. The original European Coal and Steel Community was the product of Jean Monnet's plan to replace national sovereignty over the two commodities most closely linked to industrial warfare with a supranational system for ensuring these goods were used for peaceful ends. Similarly, the Treaty of Rome was accompanied by a plan for a Common Agricultural Policy geared towards food security. Already in 1975, the Commission warned the Council to prepare for possible supply shortages of raw materials and discussed mitigation strategies including research and recycling (European Commission, 1975). Whereas the decades immediately after the fall of the Berlin Wall saw a marked liberalisation in EU trade policy, in the past few years, supranational economic planning in the shape of market interventions to secure supplies of various goods has staged something of a comeback.

Following the appointment of a new College of Commissioners in 2019, two events put security of supply at the top of the policy agenda. Firstly, the COVID pandemic demonstrated the manifold risks associated with supply chain disruption because of national protectionism when dealing with a medical emergency requiring countermeasures such as masks, surgical gowns, vaccines, etc (World Trade Organization, 2023). Secondly, Western attempts to sanction Russia's economy since the full-scale invasion of Ukraine highlighted both the significance of critical materials and products such as semiconductors across a range of civilian and military uses as well as serious limitations in the EU's armaments supply chain. In response to COVID, the Commission pioneered market-directing interventions in the field of health policy, as exemplified by the vaccine procurement scheme and a new stockpiling facility for medical countermeasures (Glencross, 2022). In the defence sector, the Commission pushed through an emergency plan to boost EU ammunition production in order to resupply Ukraine with artillery munitions (Clapp, 2023).

Thus, European institutions have faced a recurring dilemma over how far to trust markets. Yet, for much of the postwar era, this dilemma took place within the relatively benign setting of a liberal international order in which many key trading partners (with the notable

exception for energy imports) were democratic allies, while global trade rules were cowritten by this same coterie (Ikenberry, 2009). Embedded within this international framework was the assumption of *Wandel durch Handel* [change through commerce], whereby an increase in global economic ties was thought to undermine illiberalism and prompt political change as well as economic benefits. It was this logic that drove President Clinton to allow China into the World Trade Organization in 2001. His political philosophy was that rejecting open markets 'could set in motion a chain reaction of protectionism that would endanger our economic future and halt the spread of political freedom' (Clinton, 1997, p. 7).

EU external trade policy reflected the principles of the liberal international order by promoting multilateralism and a rules-based system governed by legal arbitration in the form of the WTO dispute resolution mechanism (Lloyd, 2001). From this perspective, the traditional battleground for the Commission was trade distortion in the form of barriers to competition erected by state regulation or subsidy regimes. A classic example of this type of issue was the 2012 anti-dumping action against Chinese solar panel manufacturers accused of benefiting from government largesse (Goron, 2018). Yet, if security of supply now occupies a central place in EU policymaking, it is because concerns about a form of globalisation that has allowed China to establish itself as a manufacturing superpower now extend well beyond economic considerations about the impact of market distortions on European jobs and competitiveness.

Rather, there is a more existential political worry about the 'weaponisation' of economic interdependence (Farrell & Newman, 2019) that could be used to challenge the European political order. Monopolistic power over critical materials is not just a way to extract rent from European consumers or help outcompete EU companies. There is a very real risk that this same economic leverage can be used to constrain EU policymaking autonomy by punishing—or threatening—European countries that vex Beijing. Examples of such behaviour already exist: In 2010, local customs officials in China blocked exports of critical rare earths to Japan in a spat over the Senkaku Islands (Klinger, 2015, pp139-140); since 2021, Lithuania's exports to China have been subject to an embargo because of the Baltic country's Taiwan policy (Barros & Sikora, 2022). In fact, between 2009 and 2020, China's export restrictions rose ninefold and constitute the largest number of any country worldwide (Kowalski & Legendre, 2023). Indeed, the EU has found itself entangled in supply chain weaponisation as a result of souring US–China relations as Washington has sought to restrict the further development of China's high-end semiconductor industry. The reaction from

Beijing, which is using large amounts of state aid to try to limit dependence on Western chip technology (García-Herrero & Weil, 2022), has come in the form of export controls on germanium and gallium introduced in July 2023 (Yang, 2023) and natural graphite in October 2023 (Financial Times, 2023). These are materials on the EU critical raw materials list and strategically important because of their use in chip and solar panel production (germanium and gallium) or lithium-ion batteries (graphite). Thus, as the European Parliament's, 2021 resolution on a European strategy for critical raw materials noted, no discussion of EU open strategic autonomy in global affairs can be considered satisfactory if it ignores supply chain issues (European Parliament, 2021).

To understand why security of supply considerations are leading EU policymakers to reconsider their commitment to free trade based on universality and reciprocity, it is important to recognise the role of China in shaping perceptions of the threat posed by supply chain disruption. Since 2019, the EU has labelled China a 'systemic rival' (European Commission, 2019), meaning EU politicians are increasingly wary of Beijing's ability to sap confidence in democratic values at home and abroad. Hence, it is imperative to analyse the EU's strategy for security of supply in the context of what the High Representative for Foreign Affairs and Security Policy dubbed 'a battle of narratives' (Borrell, 2020), in which China seeks to demonstrate that its economic and political system can outperform European democracy. Vaccine diplomacy during the COVID pandemic gave a glimpse of this nascent field of contestation as Chinese diplomatic efforts sought to play up their supposedly better handling of the virus and rejected the notion that Western-developed vaccines were superior to their domestically produced variant (Chen, 2022).

In this sense, COVID acted as a wake-up call because it made clear the link between a health emergency, in which supply chain disruption required novel Europe-wide solutions, and the maintenance of the EU polity. Three economic sectors in particular were targeted by von der Leyen as Commission President in order to ensure security of supply: pharmaceuticals, semiconductors and critical raw materials. It is because these are post-pandemic policies, meaning the consequences of disruption were far better understood, that the analysis chooses to focus on them. In particular, it highlights how the EU is preparing for a future in which, because of weaponisation and other potential shocks, supply chain disruption is not a one-off. At the same time, the analysis contrasts the measures taken in each sector in order to highlight commonalities and explain differences in approach and impact. In particular, a comparison of the EU's three principal policies for mitigating supply chain disruption enables not only a better understanding of how invested Brussels is in

geoeconomic hedging but also of the political fears that motivate such action.

3 | A SECTORAL OVERVIEW OF THE EU'S APPROACH TO SECURITY OF SUPPLY

3.1 | The pharmaceutical sector

Prompted by the COVID-19 pandemic, EU policymakers launched a Pharmaceutical Strategy intended to address, in addition to other desiderata, security of supply and mitigate risks of medicines shortages (European Commission, 2023a). This strategy was a response to existing worries about shortages, as highlighted by the European Parliament (2020), and potential dependencies linked to over-reliance on imports of Active Pharmaceutical Ingredients (APIs). The latter consist of the pharmacological substances that render medicines effective; China represented over 20% of EU API imports by volume in 2021, (European Centre for International Political Economy, 2020, p. 15) while accounting for just under 80% of antibiotic APIs that year (Bayerlein, 2023).

The potential political and economic impact of widespread supply disruption in the pharmaceutical supply chain became obvious during the COVID pandemic as countries scrambled to mobilise medical countermeasures. Moreover, nationally reported medicine shortages peaked in 2019 (Directorate-General for Health and Food Safety, 2001). In response, the EU aims to update its regulatory approach in the sector to ensure that companies (marketing authorisation holders or MAH) have a duty to prepare and keep up to date shortage prevention plans for their medicines. In addition, the EU will establish—as it has done with raw materials—a list of critical medicinal products, that is, medicines considered critical for health systems at all times.

These measures follow a logic of preparedness as they are anchored in the newly created Health Emergency Preparedness and Response Authority (HERA) Directorate-General. Two of its five core missions are directly related to security of supply: 'procuring, stockpiling, and distributing medical supplies' and 'addressing market challenges' and strengthening 'open strategic autonomy'. HERA's tools include soft-law measures in the form of recommendations issued to companies and pharmaceutical stakeholders to improve security of supply. However, there is also a hard-law component in the guise of granting the Commission powers to mandate the creation of contingency stocks. Stockpiling is a preferred method for mitigating health emergencies, as witnessed after the H5N1 avian 'flu outbreak' in 2005, which prompted a flurry of stockpiling activity across

EU member states, but without centralised coordination (Elbe et al., 2014). The COVID pandemic demonstrated not only the need to create **stockpiles of critical medicines and countermeasures on a far more coordinated basis, but also illustrated the importance of vaccine manufacturing capacity in times of emergency. Hence, another measure for improving pharmaceutical security of supply is the EU FAB programme for financing reserve manufacturing capacity to make vaccines in the EU in the event of a future health emergency** (European Health and Digital Agency, 2023).

However, the meagre €160 million earmarked for the 'ever warm' vaccine manufacturing capacity under the FAB scheme (European Commission, 2023b, p. 99) suggests a limited impact on removing dependencies as member state action to supplement these funds is constrained. This is because pharmaceutical manufacturing is not included in the list of 'important projects of common European interest' (IPCEIs), which the Commission (2021) initiated to promote projects targeting strategic dependencies by loosening state aid rules for member state subsidies. As a result, pharmaceuticals are treated differently from electric batteries, raw materials, chips, cloud computing and hydrogen. Nevertheless, medical shortages have proved politically problematic in various EU member states, notably in France, which temporarily suspended Internet sales of paracetamol in 2023 and where President Macron has invested significant political capital in reshoring paracetamol manufacturing. Yet, the absence of a harmonised EU definition and notification system for medicine shortages indicates that EU-wide politicisation of this issue is currently limited, reflecting the fragmented nature of public health systems across Europe.

3.2 | The semiconductor sector

It was no coincidence that in her first speech as President-elect to the European Parliament, von der Leyen announced that semiconductors would be central to the geopolitical vision of her Commission. She announced that the EU 'must have mastery and ownership of key technologies in Europe. These include quantum computing, artificial intelligence, blockchain, and critical chip technologies' (Von der Leyen, 2019). The immediate context for this speech was President Trump's imposition of restrictions on the sale of US technology, including semiconductors, to the Chinese telecoms giant Huawei and measures to restrict domestic use of its products in US critical infrastructure (Brown, 2020). The importance of the chip supply chain is also a source of friction among Western-allied countries. A few months before the speech, Japan had imposed export restrictions on materials and goods used by the Korean semiconductor

industry as a result of trade and diplomatic tensions (Goodman et al., 2019). This move came on the back of a serious decline in market share for Japan's semiconductor industry.

Hence, the Commission's semiconductor strategy coincided with a growing awareness of supply chain vulnerabilities in the semiconductor industry, which has experienced a stratospheric rise in Chinese chip production capacity in the past two decades. The latter is closely connected to Chinese security policy, which has at its core the creation of a defence industrial base in semiconductors designed to reduce and even overcome the technology gap with the US military (Ming-Chin, 2023). Already in 2015, in the wake of a US embargo on the sale of Intel chips to update a Chinese supercomputer, China pivoted to domestically produced components (Zhang, 2023). Yet, it is still on Taiwan that global supply chains are incredibly reliant: Taiwan Semiconductor Manufacturing Co Ltd (TSMC) dominates production of advanced chips. Consequently, one of the greatest threats to the global supply chain is China's increasingly assertive stance on Taiwan; a blockade or invasion would cripple trade in chips.

The EU response, mirroring earlier initiatives by the Biden administration in the United States, has been to promote an industrial strategy targeting the semiconductor sector in order to avoid strategic dependencies. The EU Chips Act, passed in 2023, thus has European autonomy at its heart because its objective is both to stimulate chip design, where the United States leads the way, and also chip production, which is largely located in Asia. In other words, the EU's ambition is to re-establish Europe within a global semiconductor supply chain from which it is increasingly excluded, with the notable exception of photolithography machine tools needed to fabricate the most advanced chips. That is why some experts warn the Chips Act goes against the liberal economic logic of the EU's comparative advantage in a sectoral niche with very high added value (Hancké & Garcia Calvo, 2022). Nonetheless, in designing the Chips Act, EU decision-makers sought to promote economic security above free market principles (Donnelly, 2023) as illustrated by the centrepiece of the legislation: a 43 billion euro package to help the sector up to 2030 (Van Wieringen, 2022). During this period, in which experts predict a 60% rise in the chip market, the EU goal is to boost semiconductor manufacturing from 10% of global supply to 20% and to shift production lines to smaller, more advanced microprocessors rather than the more basic ones used for Europe's car industry. The Chips Act puts a special emphasis on incubating start-ups and financing R&D. However, a crucial component of the strategy is essentially a new regulatory approach to state aid in the European semiconductor industry. That is, the Commission has promised to adopt a more lenient stance on national state aid of the kind that has been used historically in Taiwan or South Korea

and, more recently, in the United States (Donnelly, 2023), where the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act earmarked US\$52.7 billion of subsidies for US chipmakers.

As a result of flexibility on state aid, the headline figure of EU-linked financing will be augmented by member state subsidies, notably from France and Germany, under the rubric of IPCEIs. One of the first such projects concerns precisely microelectronics, although it took 3 years to get off the ground (Hancké & Garcia Calvo, 2022, p. 590). The domestic political salience of allocating significant state aid to this sector is hard to evaluate, even if the German Chancellor sought to make political capital out of Intel's decision to build a large base in Magdeburg (Donnelly, 2023, p. 134). More salient for EU decision-makers is the threat of being caught in the crosshairs of US chip policy targeting China. The Biden administration ramped up restrictions on trade with China by banning the export of chips more advanced than 28 nanometres to China for 10 years. It also imposed controls, intended to protect US advances in the sector, on supply chain inputs used in Chinese chip manufacturing (Triolo, 2024). Consequently, ASML—the Dutch-based company that represents the EU's comparative advantage in photolithography machine tools—was placed in the firing line as the US government sought to coax its Dutch counterpart to accept end user controls on ASML exports (Triolo, 2024). Thus, the global semiconductor industry, where state aid already played an important role, is increasingly moving away from the free-trade principles of universality and reciprocity as the United States seeks to limit Chinese chip-manufacturing technology and Beijing responds by promoting a domestic industry free from Western inputs. It is this geoeconomic context that explains why the EU strategy for the sector does not rely purely on a logic of comparative advantage and open global markets.

3.3 | Critical raw materials

The field of critical raw materials is where the EU has been most active, having first sought to address the problem in the 2000s, as seen in Table 1.

The legislation at the heart of the EU's current strategy in this area is the Critical Raw Materials Act, which has a number of key objectives covering: diversification of supply, targets for recycling, domestic extraction and processing within the EU. There is also a provision for joint EU purchasing of strategic raw materials and the creation of an information-sharing mechanism for monitoring stocks of such materials in the EU, but no new EU funding is allocated to support mining, recycling and processing projects that typically have large investment costs and long lag times (Findeisen & Wernert, 2003).

There are specific targets for improving security of supply covering 16 strategic raw materials (selected among the RMI list of critical raw materials), which consist of reaching by 2030:

- At least 10% of the EU's annual consumption for **extraction**;
- At least 40% of the EU's annual consumption for **processing**;
- At least 25% of the EU's annual consumption for **recycling**;
- **Not more than 65%** of the Union's annual consumption of **each strategic raw material at any relevant stage of processing** from a single third country.

As with the semiconductor strategy, Brussels' approach to raw materials is also based on streamlining permits for industry to help achieve these goals. Strategic projects associated with the CRM Act would expect to gain permission within 2 years if they concern extraction, or only 12 months for recycling or processing. The aim was also to facilitate access to finance, including potentially via state aid. However, there is a recognition of the possibility of discontent over the siting of industrial facilities; hence, engagement of local communities is a criterion for strategic projects. The current wording specifies that such projects need to incorporate 'measures to facilitate public acceptance' (European Commission, 2023c, p. 41) as part of their application.

Sourcing of raw materials inherently concerns EU external policy, as seen in Table 1, which captures a number of bi- and multilateral initiatives seeking to coordinate security of supply with partners such as the United States, India and the G7. Raw materials are now a priority of EU trade policy, whether in the form of new or updated Free Trade Agreements (FTAs) such as the proposed modernisation of the EU–Chile FTA, or via strategic international partnerships as set out in the Commission's 2020 Action plan. Since its launch, the Commission has negotiated nine such partnerships with Canada and Ukraine (2021), Kazakhstan, Namibia (2022), Argentina, Greenland, the Democratic Republic of Congo, Zambia (2023) and Rwanda (2024).

Compared to pharmaceuticals and semiconductors, the EU has been taking action for a longer period to address security of supply issues, thereby making it possible to identify changes in approach. When Brussels first sought to tackle issues in the critical materials supply chain, the primary concern was the risk to European competitiveness and the preferred remedy was trade liberalisation to ensure a level playing field. Such was the initially free-trade logic of the 2008 RMI, whose first pillar consisted of a raw materials diplomacy that targeted export duties and other restrictive practices imposed by producer countries that pushed up prices for EU manufacturers

TABLE 1 A timeline of EU critical raw materials policy measures.

Date	EU Initiative
2007	The Council of the EU calls on the Commission to develop a coherent political approach to raw materials supplies
2008	Commission launches the Raw Materials Initiative (RMI)
2011	Commission identifies 14 critical raw materials as part of RMI First EU–Japan–US joint workshop on critical materials
2012	European Innovation Partnership on Raw Materials established as public–private network concentrating on technological innovation to address raw materials supply chain needs
2014	RMI list of critical raw materials expanded to 20
2017	RMI list of critical raw materials expanded to 27
2018	Creation of EU–Latin America Partnership on Raw Materials
2020	Launch of Action Plan on Critical Raw Materials RMI list increased to 30 Establishment of European Raw Materials Alliance a stakeholder network to diverse supply chains Publication of Foresight Study on critical raw materials
2021	European Parliament adopts resolution on a European Strategy for Critical Raw Materials European Council requests Commission to outline a path towards enhancing research, technology development and innovation, and reducing the EU's strategic dependency in the area of critical technologies and value chains for security and defence European Commission launches Observatory for Critical Technologies EU-US Trade and Technology Council established
2022	Versailles declaration by European Council, calling for measures to reduce strategic dependence in critical raw materials European Commission joins Minerals Security Partnership launched by G7 in Toronto European Commission launches roadmap on critical technologies for security and defence Commission President von der Leyen announces proposal for a Critical Raw Materials Act
2023	RMI list of critical raw materials expanded to 34 Commission formally adopts proposal for Critical Raw Materials Act Second Foresight Study on Critical Materials published EU–India Trade and Technology Council established three additional CRMs added to EU list as part of negotiations over CRM Act The Council of the EU authorises negotiations with the United States to conclude a Critical Minerals Agreement to mitigate the effects of the Inflation Reduction Act

and consumers. Illustrative of this push against 'resource nationalism' was the EU's successful litigation, allied with Japan and the USA, at the WTO against China's rare earths export quota restrictions in 2014 (Mancheri, 2015). Victory in using the WTO dispute resolution mechanism—the centrepiece of the liberal international order for trade—led to an increase in exports of rare earths, thereby easing the supply chain and stabilising prices (Mancheri et al., 2019, p. 106).

Yet, the EU's primarily WTO-focused strategy has evolved. Rather than placing unlimited faith in the principles of universality and reciprocity enshrined in the WTO, Brussels's approach to critical raw materials shows a shift in motivation and method. The CRM Act as well as the raw materials strategic partnerships emphasise the need to build supply chain resilience free from dependence on China rather than rely on the enforcement of international trade rules. The targets for supply diversification alongside significant increases in EU extraction, processing and recycling have to be read

as a sign that, notwithstanding the EU's commitment to a rules-based order, policymakers are wary of depending on a system of global supply chains at the mercy of weaponisation. Similarly, the move to forge privileged critical raw material trading relations with producer countries, backed by infrastructure and other forms of inward investment, demonstrates that the primary motivation in this sector is securing access to resources by offering market advantages to strategic partners (Hool et al., 2023). Indeed, there is a form of convergence with China's raw materials diplomacy in the way that the EU is increasingly turning towards infrastructure financing as part of its diversification strategy (Tröster et al., 2017). Key differences remain in the sense that the EU emphasises conditionality linked to the UN's sustainable development goals and is not sponsoring state-owned enterprises. This logic of moving beyond conventional free-trade oriented policy for this sector is especially clear in the CRM Act's proposal for a 'Critical Raw Materials Club' that if implemented would give rise

to a collective-purchase agreement system to reduce China's market power and could supplement the WTO system by providing a defensive mechanism against weaponisation (Findeisen & Wernert, 2003).

4 | COMPARING SECTORAL STRATEGIES: WHAT EXPLAINS THE EU'S PRIORITIES?

It is instructive to compare the measures the EU has put in place in three sectors bound by a common pre-occupation for ensuring greater security of supply. This can be done in two ways: by examining the level of financial support earmarked for each sector and the potential impact these measures will have if fully implemented. Table 2 captures where each sector stands on these two metrics.

As presented in section 3, the level of EU financial support varies between critical raw materials, where no new funding was allocated and semiconductors, which has significant funding attached, while in pharmaceuticals, the sum is very modest. The difference between the latter and the two other sectors is that IPCEIs are possible for critical raw materials and semiconductors, meaning financing could come from the member states directly. This helps explain why it is more realistic to expect a greater impact on the supply chain in those two sectors, particularly in the field of critical raw materials where the EU has equipped itself with more policy tools, whereas in semiconductors, the complex global supply chain is already under strain from Sino-American tensions.

Such a comparison begs the question of why the EU has so far prioritised critical raw materials when it comes to security of supply, both in terms of the number of measures and the extent of their impact if implemented fully. To explain this focus, it is important to understand the politics, not just the economics, of avoiding strategic dependence. That is, the fear driving EU policymakers to address security of supply is not just an economic consideration related to the risk of rent-seeking by third countries or price instability

faced by EU producers and consumers. Rather, the driving force is also the worry that the political risk inherent in certain global supply chains is such that weaponisation, or a natural emergency, could stoke a backlash against the EU. Such was the case already at one point during the COVID pandemic, when the seemingly slow rollout of the vaccine programme led some member states (Hungary and Slovakia) to licence the Russian vaccine, which became a topic of political debate in France and Germany too (Kazharski & Makarychev, 2021).

Table 3 captures the way various scenarios for supply crises in each sector are in turn linked to a particular type of strategic dependence and a form of potential anti-EU political backlash. What emerges from this contrast is the fact that China, as an officially designated systemic rival of the EU (unlike India on which the EU is also highly dependent for certain APIs), is at the heart of security of supply preoccupations across pharmaceuticals, semiconductors and critical raw materials. Moreover, each type of supply chain risk carries with it the potential for politicisation against the EU in the absence of effective mitigation. Yet, there is something that distinguishes the risk profile of weaponisation of critical raw materials compared with threats to supply chains in pharmaceuticals and semiconductors. A pandemic or a major earthquake in Taiwan (a central nub in global semiconductors and prone to earthquakes) are so-called high-impact, low-probability events, while a China–Taiwan conflict remains a hypothetical scenario. By contrast, the weaponisation of critical raw materials has already taken place and, unlike the other kinds of risks, constitutes a lever that can be pulled and then released by a systemic rival. This difference suggests the need for action to mitigate supply chain risk is highest in this sector.

In addition, the political salience of critical raw materials is amplified by the fact that they are absolutely central to the EU's world-leading carbon reduction targets. Whereas the lack of medical countermeasures in a pandemic and the economic damage of semiconductor disruptions could, in the circumstances, pose

TABLE 2 Comparing EU strategies for security of supply.

Industrial sector	Level of new EU financial support	Potential impact on security of supply if successfully implemented
Pharmaceuticals	Low and no possibility of member state aid via IPCEI	Low (small investment in 'ever warm' vaccine facilities, possibility of compulsory stockpiling mandated by Commission but not automatic)
Semiconductors	High and possibility of member state aid via IPCEI	Low to medium (ambitious chip production targets, but highly competitive industry with competing state aid incentives and where global supply chain is at mercy of US–China tensions)
Critical raw materials	Absent yet possibility of member state aid via IPCEI	Medium to high (ambitious diversification and recycling targets, possibility of securing improved access via strategic partnerships and/or buyers' club)

TABLE 3 Threats, strategic dependence and potential political backlash in three industrial sectors.

Industrial sector	Scenario threatening security of supply	Associated strategic dependence	Potential form of EU backlash
Pharmaceuticals	Pandemic health emergency	Dependence on systemic rival (China) for medical countermeasures (drug ingredients, vaccines, masks, etc)	Politicisation of failure to protect EU population
Semiconductors	Supply crunch caused by natural disaster or by conflict	Dependence on Taiwan-based fabrication plant and on systemic rival (China) that could cross-weaponise other dependences	Politicisation of economic damage caused by chip shortage
Critical raw materials	Politically motivated shortages (i.e. weaponisation) created by monopoly supplier (China)	Dependence on systemic rival (China)	Politicisation of Brussels' green ambitions

an existential threat in the future, the EU has already committed to an across-the-board green transition that depends on maintaining consensus around the green deal. Yet, political support for this project cannot be taken for granted as it is susceptible to attack by populist parties (Selk & Kemmerzell, 2022) and also contestation by social movements, as exemplified by farmer protests or the 'yellow vests' in France which mobilised not just climate sceptics but also citizens concerned by the redistributive nature of ecological policies (Levain et al., 2022). In this context, weaponisation of critical raw materials appears an attractive option to pressure the EU, similar to Russia's strategy with gas exports, which explains its use as a means for China to retaliate against US chip export restrictions and hence its priority focus for EU policymakers.

5 | CONCLUSION: THE IMPACT OF EU SECURITY OF SUPPLY MEASURES ON THE LIBERAL INTERNATIONAL ORDER

This article has demonstrated the various measures the EU has put in place across three industrial sectors—pharmaceuticals, semiconductors and critical raw materials—to mitigate supply chain disruption. It explained the reasoning behind prioritising critical raw materials with a number of measures that reveal growing scepticism about the ability of free trade overseen by the WTO to guarantee security of supply. This shift in Brussels' policy stance is significant because open trade and multilateralism are two foundations of the liberal international order the EU has long sought to promote (Ikenberry, 2018). While that supposed order was not necessarily rules-based, in the sense that restraints on US rule-breaking were

extremely limited, this economic and political order was essential to create trust in the global market as the most efficient solution to security of supply (Ikenberry, 2018).

However, the EU's new focus on avoiding strategic dependencies, especially in the area of critical raw materials, testifies to an important move away from market-making diplomacy that targets export duties and other restrictions while seeking trade resolution via the WTO, towards market-directing mechanisms involving state aid, stockpiling and regulatory interventions designed to create emergency capacity. Hence, this change illustrates not only the fraying of the liberal international trade order but also the part that the EU is playing in this transformation. The selective 'refortification' of European capitalism, to reprise Lavery (2024), involves the use of diplomacy and industrial policy to reconfigure the relationship between markets and the state in order to privilege security of supply over a commitment to market competition. Fear of strategic dependence is thus inherently linked to an awareness, based in part not only on hypothetical scenarios but also instances of weaponisation, that the trade rules regulating global capitalism cannot be relied upon in the case of emergency, whether a natural or politically generated event.

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CONFLICT OF INTEREST STATEMENT

No conflicts to report.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

ETHICS STATEMENT

This research was conducted without any conflict of interest or use of sensitive data.

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ENDNOTE

¹ The EU's efforts to promote digital or technological sovereignty via the Strategic Technologies for Europe Platform and the proposed European Tech Champions Initiative are not analysed here as they are not properly speaking directly related to the security of supply for industrial goods nor are their raw material inputs subject to global supply chains (Seidl & Schmitz, 2023). Moreover, the EU's European Food Security Crisis Preparedness and Response Mechanism is also not covered because global trade rules have long sought to carve out exceptions for liberalising trade in agricultural goods, as illustrated by the EU's Common Agricultural Policy. Finally, while the EU has also developed a Battery Strategy, this aspect of supply chain concerns is already present as part of the Critical Raw Materials act as electric vehicle batteries rely on permanent magnets engineered from rare-earth components.

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