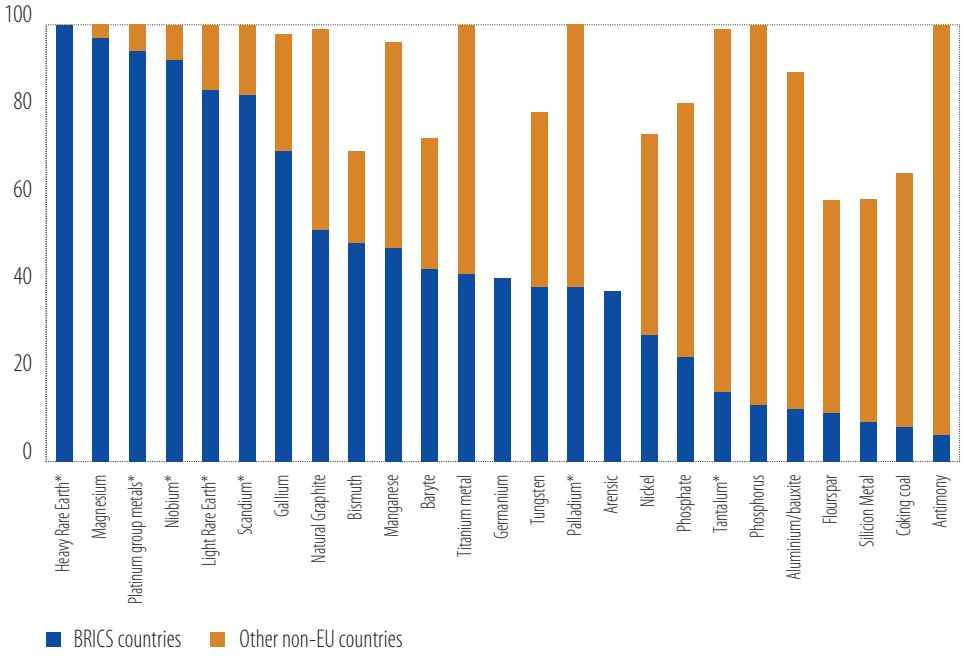
The supply of many critical raw materials is highly concentrated in specific geographic areas. The European Union's industry and economy are reliant on international markets to provide access to raw materials, since they are produced and supplied by third countries. Although certain critical raw materials are produced in the European Union, in many cases Europe is highly dependent on imports from non-EU countries (especially Brazil, Russia, India, China and South Africa) (Figure 31). The risks associated with production concentration are compounded by low substitution. This not only highlights the competitive advantages that the countries with these raw materials (such as China) hold in developing key technologies and enhancing them, but also exposes the geopolitical risk embedded in the supply chains involving raw materials that could emerge when diplomatic relations become tense. Europe should not only ensure the supply of critical raw materials, but also increase investment in recycling (including of old batteries) and substituting technologies to enable the use of other materials.

Figure 31
Sources of EU imports of selected critical raw materials (in %)



Source: *EIB staff calculations based on European Commission (2023b).*
Note: *BRICS countries include Brazil, Russia, India, China and South Africa. The EU import share of the materials marked with asterisks was estimated on the basis of the BRICS share of global production. The bars do not all add up to 100% because some critical raw materials are sourced domestically or imported from EU countries.*

Box C
A review of EU trade dependencies

Global value chains are complex networks that manage the production and distribution of goods, linking multiple buyers and suppliers across various stages of supply chains. Over the past three decades, global value chains have undergone hyper-globalisation, resulting in highly dispersed geographical production. This fragmentation has increased trade gains and risk sharing for countries, firms and consumers (Antràs and Chor, 2022; Backus et al., 1992). Simultaneously, it has led to a large concentration of production at certain stages, making economies and firms vulnerable to local supply shocks that can propagate to downstream industries (Boehm et al., 2019; Bonadio et al., 2021; Di Giovanni et al., 2024). Such trade dependencies, as underscored by

the COVID-19 pandemic and the Russia-Ukraine conflict, can lead to supply chain disruptions and shortages of critical goods (European Commission, 2020; Baldwin and Freeman, 2022; Thoenig, 2023; Mejean and Rousseaux, 2024).

Countries are facing a trade-off between the benefits of global value chains and the need to increase resilience to risks stemming from trade dependencies. The European Union and the United States have recently implemented resilience policies (such as the European Chips Act or the 2021 Executive Order on America's Supply Chains) to mitigate these risks through diversification and local production. Given this trade-off, such policies are essential, especially considering firms' potential underinvestment in resilience because of network and information externalities. The challenge of these policies also lies in correctly identifying vulnerabilities, isolating the risk the policies aim to address and balancing the costs of resilience with traditional trade benefits.[11]

This box identifies trade vulnerabilities imported by the European Union at a product level and cross references them to understand potential risks arising from their position within global value chains, geographical origins and specific sectors. Identification is performed by applying a first set of criteria based on European Commission (2021), where a product is vulnerable if it simultaneously meets criteria for (i) high import concentration, (ii) the significance of extra-EU imports, and (iii) no substitutability of these imports with EU exports. An additional set of criteria based on Mejean and Rousseaux (2024) selects vulnerabilities where a product (iv) is mainly reliant on extra-EU imports to meet domestic demand (absorption) and (v) has very low potential to substitute suppliers.[12]

The inclusion of more criteria identifies fewer but more acute vulnerabilities. Out of the 5 381 products imported by the European Union during the period before the financial crisis, 272 are characterised by high import concentration, the significance of imports coming from beyond the European Union and a lack of domestic exports that can be substituted (Figure C.1). Restricting the analysis to products mainly reliant on extra-EU imports to meet domestic demand reduces vulnerabilities to 125, while adding criterion (v) isolates 29 products with extremely low potential for supplier substitution.

While trade dependencies have increased over time, the difference between the products identified by the two methodologies remains relatively stable. Between 40% and 54% of the vulnerabilities identified have EU production that mainly satisfies domestic demand, and once criterion (iv) has been added, 77% to 80% can easily be substituted by using different suppliers. While acute vulnerabilities represent only a tiny fraction of total EU trade volumes (from 0.19% to 1.01% depending on the period and after applying all five criteria), these products pose significant risks to European value chains.

Vulnerabilities tend to persist over time. While trade dependencies can change over time, 41% of dependencies identified before the global financial crisis persisted directly after the crisis, and 35% remained after that (after applying all five criteria). The COVID-19 pandemic marked a turning point in the number of dependencies, regardless of the methodology.

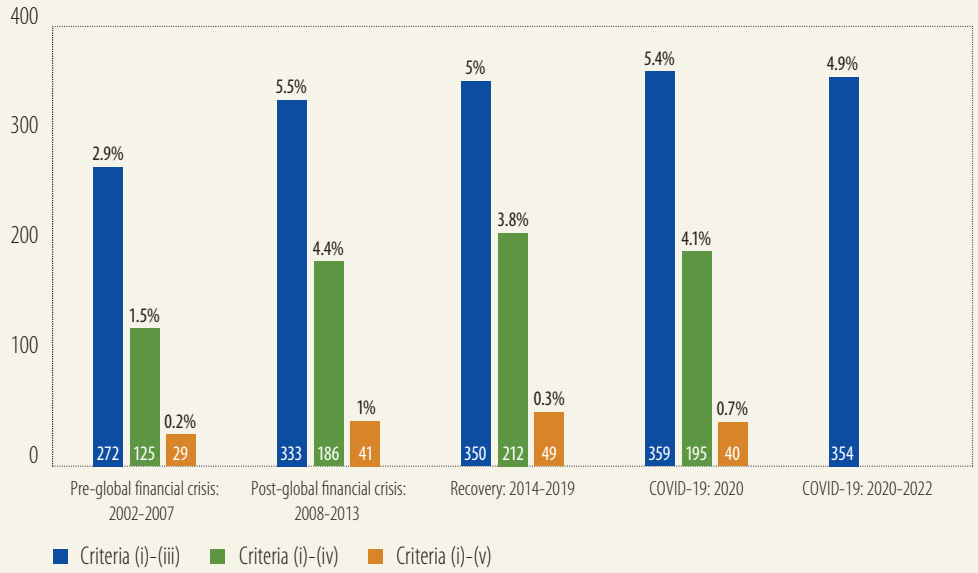
The more upstream a product is in the global value chain (for example raw materials or intermediate inputs at the early stages of the production process within a supply chain), the larger its potential

11 Several methodologies have emerged following the COVID-19 pandemic, including those by the French Treasury (Bonneau and Nakaa, 2020), the French Council of Economic Advisors (Jaravel and Mejean, 2021), the European Commission (2021), the CESifo (Baur and Flach, 2022) and Mejean and Rousseaux (2024).

12 The five criteria are applied to EU commodity trade from 2002 to 2022, covering pre/post-global financial crisis, recovery and COVID-19 periods using the CEPII-BACI dataset (Gaulier et al. 2010), covering worldwide trade flows of over 5 000 products at the detailed HS 6-digit level. Criteria (iv) and (v) incorporate, at the same product level, manufacturing output from the Eurostat Prodcom dataset and the relationship stickiness measure of Martin et al. (2023).

impact. However, a downstream product can also cause significant damage if it is central to the production of essential goods (Baur and Flach, 2022). As stressed in Mejean and Rousseaux (2024), some 30% of vulnerable products are consumer goods imported from China. Shortages of these items can hurt consumers and specific firms, but they tend to affect production less. Conversely, supply shocks in the most upstream parts of global value chains (especially through intermediate goods that enter the value chains at early stages) can propagate to downstream industries, adjacent supply chains and consumers. Figure C.2 displays the share of products according to how far upstream they are in the value chain – or how many production stages are needed before a product is ready for final consumption (Antràs et al., 2012). The riskiest vulnerabilities are located more than three production stages away from the final consumer. Despite a slight decrease over time, these products represent 49% of the vulnerabilities identified by the five criteria (on average and across all periods).

Figure C.1
EU trade dependencies over time (% of imports and number of products)**, by methodology**



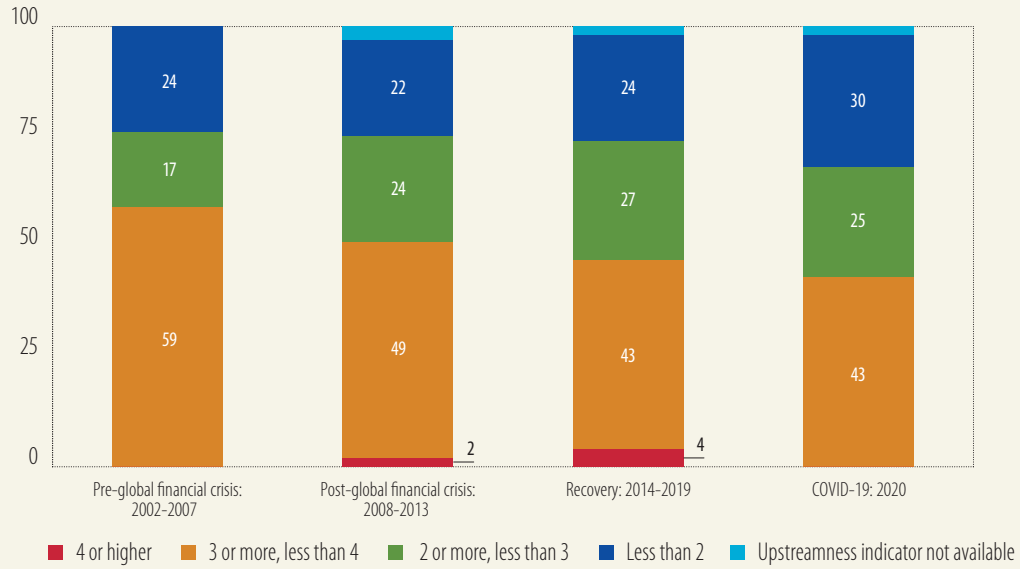
Source: *CEPII-BACI data over 2002-2022 and Eurostat Prodcom over 2002-2020.*
Note: *The total number of products imported by the European Union for each period is 5 381 except for the period following the global financial crisis (2008-2013), when it is 5 379. The products are classified as UN Harmonised System 6-digit (HS6). Criteria (i-iii) follow European Commission (2021), Criteria (iv-v) follow Mejean and Rousseaux (2024).*

Trade dependencies are increasingly associated with Chinese exports. Against a backdrop of rising geopolitical tensions, the concentration of a large share of global production in China poses a significant risk. Political instability (such as the US-China trade war that started in 2018 or issues in the sourcing of cobalt in the Democratic Republic of the Congo) imposes heavy costs on reliant economies. The share of China in EU import vulnerabilities is rising, while the shares of the United States and the rest of the world have dropped by 3 to 10 percentage points (Figure C.3). Overall, China's share is higher for products that are not readily produced in the European Union.

Most vulnerabilities and risks are concentrated in the chemicals, ceramics and metals sectors. The imported products identified by the European Commission's three criteria are mainly produced in manufacturing sectors, and nearly all appear when applying all five criteria (Figure C.4). When products with the lowest levels of substitution with EU production and between suppliers are isolated, the shares of the chemicals, ceramics and metals sectors are particularly high.

Figure C.2

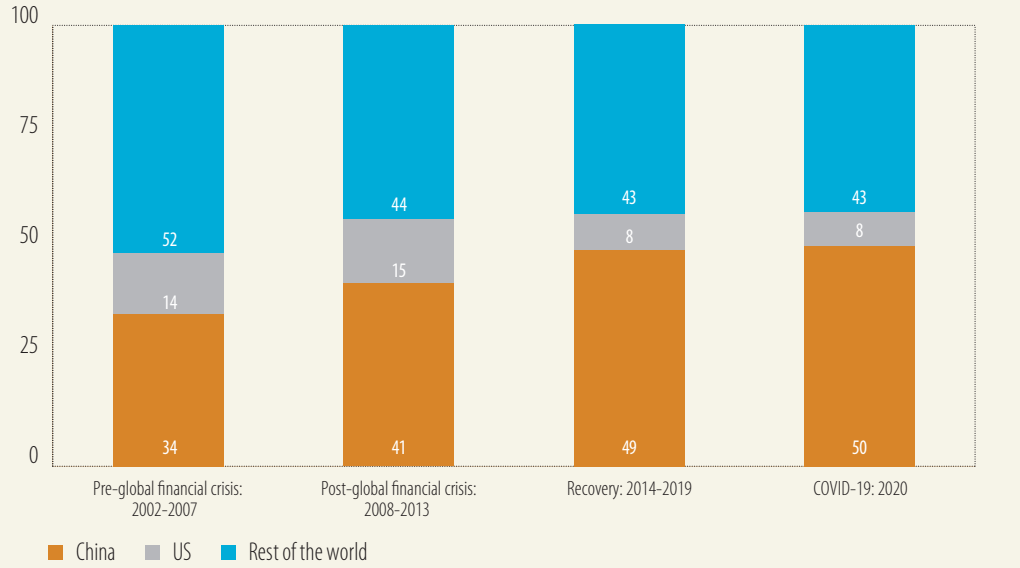
Upstreamness of EU trade dependencies for the five criteria methodology (% of products)



Source: *CEPII-BACI data over 2002-2022 and Eurostat Prodcom over 2002-2020.*
Note: *The total number of products imported by the European Union for each period is 5 381 except for the period following the global financial crisis (2008-2013), when it is 5 379. The upstreamness indicator value shows the approximate number of production stages before a good reaches its final consumer. An upstreamness value of 1 corresponds to a product ready for immediate consumption and an upstreamness value of 4 indicates that there are four remaining stages before the product reaches the consumer. The products are defined at UN Harmonised System 6-digit (HS6), and vulnerability criteria follow Mejean and Rousseaux (2024).*

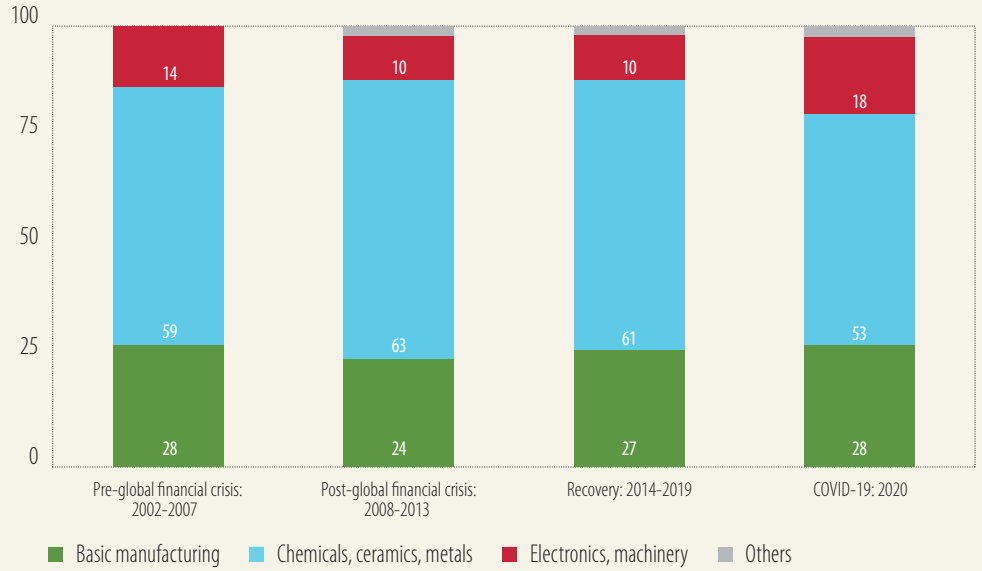
Figure C.3

Main origin of EU trade dependencies for the five criteria methodology (% of products)



Source: *CEPII-BACI data and Eurostat Prodcom over 2002-2020.*
Note: *The total of vulnerable products (HS6) imported by the European Union for each period respectively is 29, 41, 49 and 40, as calculated using the five criteria of the HS methodology (Mejean and Rousseaux, 2024).*

Figure C.4
EU trade dependencies (% of products)**, by sector**



Source: *CEPII-BACI data and Eurostat Prodcom over 2002-2020.*
Note: *The total of vulnerable products (HS6) imported by the European Union for each period respectively is 29, 41, 49 and 40, as calculated using the five criteria of the HS methodology (Mejean and Rousseaux, 2024). Basic manufacturing (NACE 2: 10 to 18, 31 to 32); chemicals, ceramics, metals (NACE 2: 19 to 25); and electronics, machinery (NACE 2: 26 to 30).*

Incorporating how countries substitute goods after an economic shock, and the impact that has on trade vulnerability, enhances our understanding of weaknesses and sources of resilience. It highlights the need for policies that target specific dependencies on products not easily substituted within the European Union and supplier diversification. Such targeted policies must consider the risks posed by these products to determine their nature and intensity. Dependencies in sectors like electronics and machinery mostly originate from China, but these products are close to the end consumer, limiting the risk of propagation through supply chains. Conversely, while dependencies in the chemicals, ceramics and metals sectors are less reliant on China, they come into play very early in global value chains, posing significant supply chain risks for the European Union and importing firms. Evaluating additional risks driven by these dependencies is crucial for the EU economy.

The debate on the need for and form of policy intervention contrasts enhanced resilience and diversification with more active industrial policies. However, intervention might be costly and subject to imperfect information and network effects. Real-time information sharing, assessing and sharing firms' indirect exposure,[13] and industry coordination between different stages of global value chains could mitigate the risks.

13 Firms can be exposed to risks unknowingly through indirect exposure, which is non-negligible in the European Union according to available data (Mejean and Rousseaux, 2024).