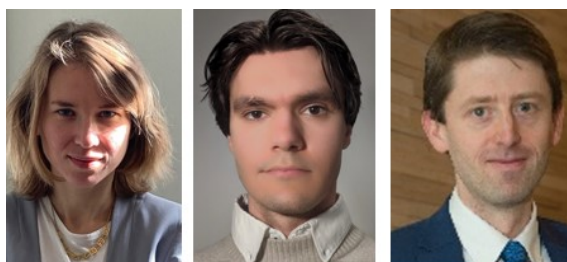


Capital in the Twenty-First Century: Who owns the capital of firms producing critical raw materials?



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The energy transition will require large quantities of critical raw materials (CRMs). Against this backdrop, the European Union (EU) has recently enacted legislation aimed at increasing the security of its supplies of critical raw materials (Critical Raw Materials Act, 2024). However, mining and processing of CRMs is geographically concentrated in countries that are geopolitically distant from the EU. While the geographical concentration of resources is well documented (Buysse and Essers, 2023; IRENA, 2023; Javorcik et al., 2023), ownership interests in extractive companies are less so. Yet documenting the sources of control of mining companies is essential for assessing strategic dependencies. In a recent paper, we show that investors from outside the European Union control a significant share of the capital of global listed companies involved in the mining of cobalt, copper, lithium, nickel and rare earths. Our results underscore the need to enhance the EU's strategic autonomy and point to the need for a metal-specific strategy.

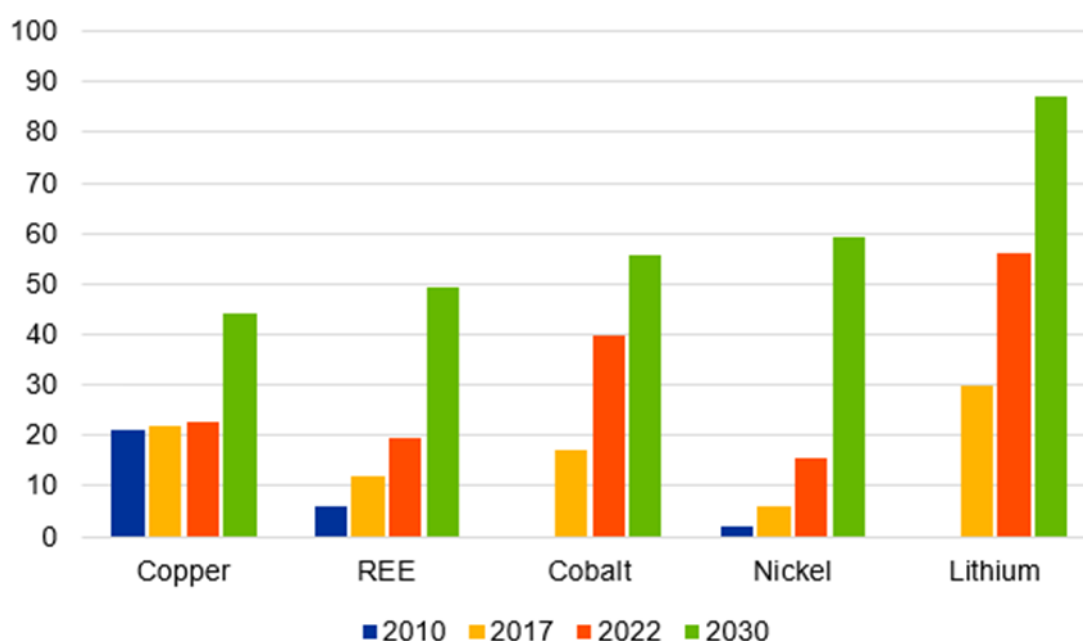
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The European Union's supply of critical raw materials is vulnerable to geopolitical risks

The energy transition will require large quantities of critical raw materials (CRMs). Projections by the International Energy Agency (IEA, 2023) indicate that the primary drivers of increased demand for CRMs will be the roll-out of electric vehicles and power grids. The increase in demand for CRMs is expected to be particularly strong for copper, cobalt, lithium, nickel and rare earth elements (see Figure 1).

Against this backdrop, the European Union (EU) has recently enacted legislation aimed at increasing the security of its supplies in critical raw materials and making itself more strategically autonomous (Critical Raw Materials Act, 2024). The European Commission has identified 34 critical materials (EC, 2023), selected based on their economic importance for the EU and supply risk.

Figure 1. Global demand for critical raw materials due to the energy transition (% of total demand)



Note: energy transition technologies accounted for 56% of global lithium demand in 2022. This share is expected to reach 87% in 2030 under an ambitious climate transition scenario (Net zero CO₂ emissions by 2050). Neodymium demand is used as an indicator for rare earth elements (REE).

Sources: IEA (2023) and authors' calculations.

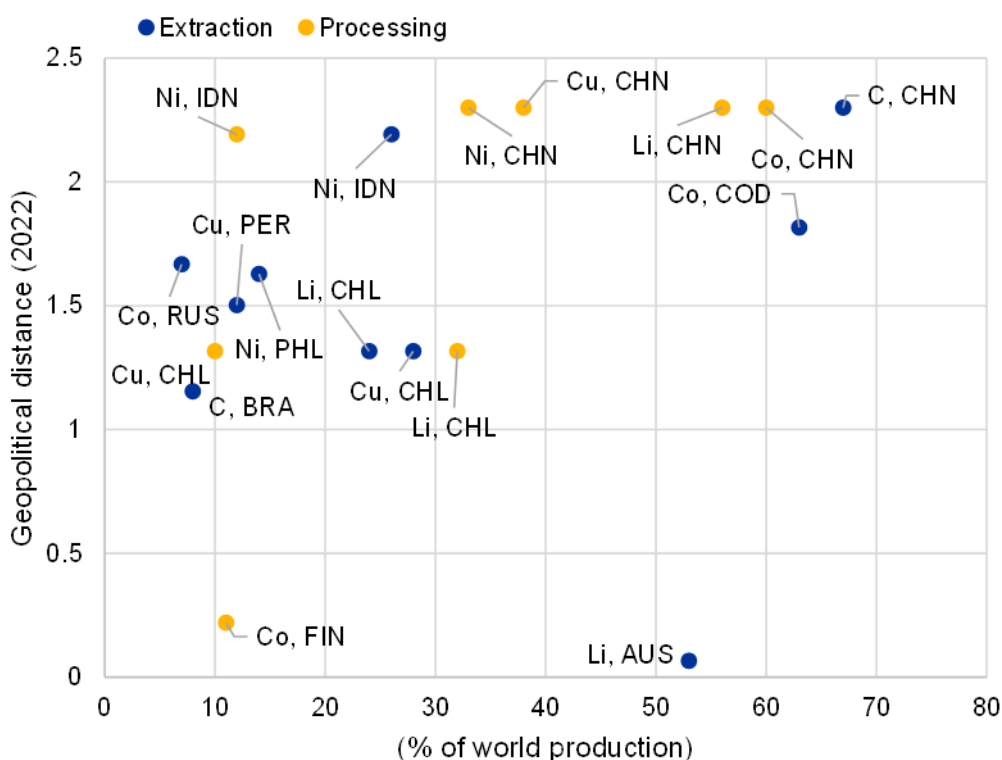
The mining and processing of critical raw materials is geographically concentrated in countries that are geopolitically distant from the EU. For instance, 73% of all cobalt is mined in the Democratic Republic of the Congo, 69% of rare earth elements are mined in China and half of the global nickel supply comes from Indonesia (USGS, 2023).

Figure 2 illustrates the concentration of critical raw materials extraction and transformation in relation to the geopolitical distance between the largest European economies (Germany, France, Italy and Spain) and critical raw materials producers. For cobalt (Co), nickel (Ni), lithium (Li) and copper (Cu), a significant share of global extraction and transformation is carried out by countries which are geopolitically distant from the EU.

The concentration of supply raises concerns that dominant countries may use their market position as leverage to pursue other strategic priorities (Buysse and Essers, 2023), highlighting an urgent need to strengthen the EU's raw material strategy.

The geographical concentration of production is compounded by a concentration of firms controlling the supply of critical raw materials, yielding oligopolistic market structures (IRENA, 2023). A handful of multinational companies and state-owned (SOEs) or -controlled enterprises dominate a considerable share of global production. For instance, the top four mining companies control around 55% of cobalt output, while the top five mining companies control 80% of global lithium output. The concentration of supply is even higher for rare earth elements (REE), where a single Chinese company controls more than 40% of global output.

Figure 2. Share of world production of EU imports (x-axis) relative to the geopolitical distance of critical raw materials producers from the EU (y-axis).



Note: The geopolitical distance reflects state positions toward the US-led liberal order, based on a dynamic ordinal spatial model, using United Nations General Assembly votes as inputs. The indicator has no unit and ranges from 0 to 6. Only the two main producing countries are shown for each mineral and production stage. C denotes natural graphite, Co cobalt, Cu copper, Li lithium and Ni nickel. AUS stands for Australia, BRA for Brazil, CHL for Chile, CHN for China, COD for the Democratic Republic of the Congo (DRC), FIN for Finland, IDN for Indonesia, PER for Peru, PHL for Philippines and RUS for Russia.

Sources: Bailey et al. (2017), European Commission (2023) and authors' calculations.

Non-European investors control a significant share of the capital of critical raw materials listed mining companies

While the geographical concentration of resources is well documented (IRENA, 2023; Javorcik et al., 2023), the ownership interests in extractive companies is less so. Yet documenting the sources of control of mining companies is essential for assessing strategic dependencies. Leruth et al. (2022) highlight the importance of understanding who controls the global supply chains of critical minerals and analyse how major shareholders can affect voting decisions in the top mining companies involved in the mining of CRMs.

To document the nationality of shareholders involved in the mining of critical raw materials, we design a comprehensive database documenting the origin of the shareholders of global listed companies involved in the mining of cobalt, copper, lithium, nickel and rare earths (Faubert et al., 2024). In line with the existing literature (Gulley et al., 2019), we equate influence (or control) over production with ownership share.

We develop several indicators to map the geographical origin of capital-owners, including production- and market capitalization-weighted holding rates, complemented by indicators focused on majority holdings.

All indicators suggest that non-European investors control a significant share of the capital of critical raw materials listed mining companies. Figure 3 summarises ownership rates by investor origin for cobalt, copper, lithium, nickel and rare earths.

- China's leading position is especially notable in the extraction of rare earths, cobalt and, to a lesser extent, lithium.
- Investors from the United States also have significant holdings, especially in the lithium and copper sectors.
- European investors hold limited stakes in CRM mining companies. The EU's relatively high stake in the nickel sector partly reflects investments located in Cyprus representing Russian interests.
- Although Latin American investors hold a significant share of the capital of firms producing lithium and copper, they are underrepresented with respect to the region's share of global production.
- The weight of Australian investors is also somewhat limited for lithium, given the size of the country's lithium resources. Indeed, while Australia accounts for half of the world's lithium production (USGS, 2023), two of its biggest lithium mines belong to Chinese companies.

Figure 3. Production-weighted holding rates in critical raw materials listed mining companies

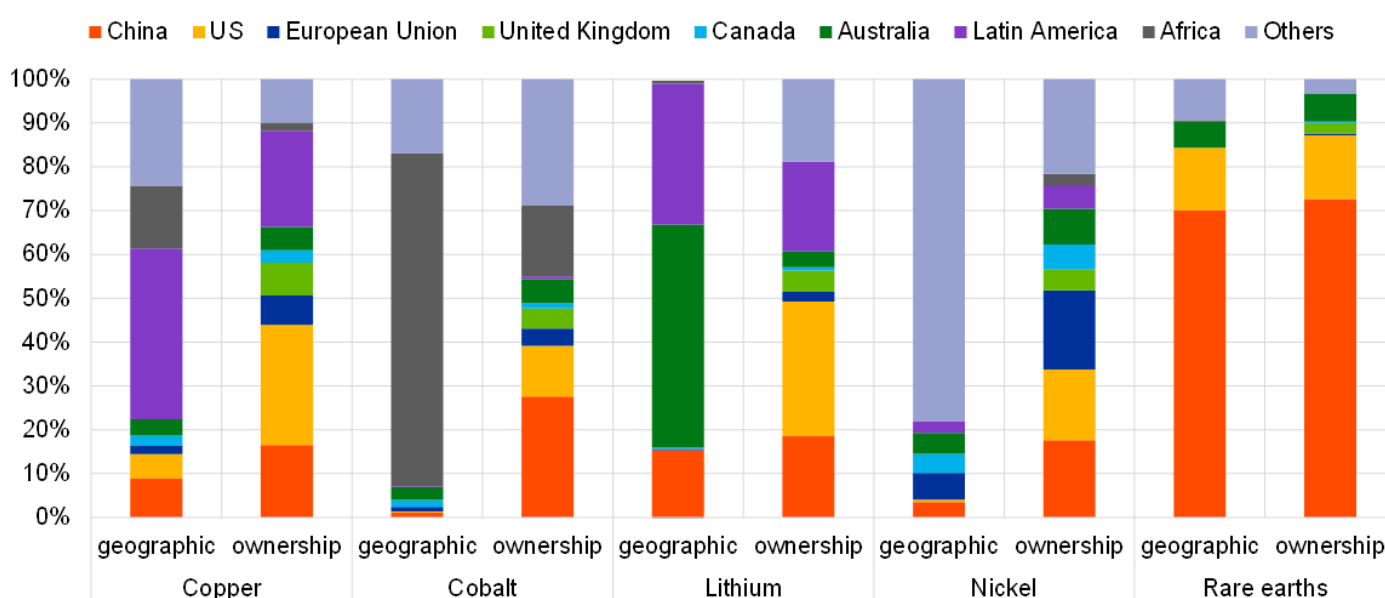
	China	United States	European Union	United Kingdom	Canada	Australia	Latin America	Africa
Rare earths	73%	15%	0%	2%	0%	6%	0%	0%
Nickel	18%	16%	18%	5%	6%	8%	5%	3%
Lithium	19%	31%	2%	5%	1%	4%	20%	0%
Copper	17%	27%	7%	8%	3%	5%	22%	2%
Cobalt	28%	12%	4%	5%	1%	6%	1%	16%

Note: The EU's holdings in the nickel mining sector, which includes an estimated 14% share for Russian investors, is closer to 4% when European investors representing Russian interests are excluded. The EU's holdings in the cobalt mining sector, which includes an estimated 3% share for Russian investors, is closer to 1% when Cypriot investors representing Russian interests are excluded.

Sources: Refinitiv and authors' calculations.

Figure 4 highlights the discrepancy that can exist between the geographical concentration of production and that of investors analysed through firm ownership. US investors, and, to a lesser extent, EU and UK investors, play a higher role in the copper and lithium supplies, relative to the production located in their respective countries. By contrast, Chinese investors have significant stakes in nickel and cobalt companies, while these minerals are predominantly mined in Indonesia for nickel and the Democratic Republic of the Congo for cobalt. For rare earths, production and capital ownership are aligned, with both the U.S. and China being major producers and investors.

Figure 4. Geographical concentration of production and ownership



Note: Nickel production is geographically concentrated in Indonesia, resulting in a substantial contribution from the 'Others' category in the bar chart that shows nickel production by region.

Sources: US Geological Survey, Refinitiv and authors' calculations.

Strategic investors play an important role in the exploitation of critical raw materials

Table 1 documents the preponderance of strategic investors such as state-owned enterprises (SOEs) and other strategic investors (including founding families, board members, or management teams) in the ownership of firms involved in the mining of rare earths, and, to a lesser extent, in the mining of cobalt, lithium and copper. Chinese investors are overwhelmingly strategic investors, which concurs with the literature (IRENA, 2023). For instance, strategic investors account for 100%, 86% and 77% of Chinese investors' holdings in firms extracting copper, REE and lithium, respectively. Strategic investors also play an important role in the exploitation of lithium and copper resources in Latin America. Indeed, strategic investors constitute 100% and 67% of Latin American investors' holdings in firms extracting copper and lithium, respectively. Overall, the last column in Table 1 confirms the predominance of strategic investors for rare earths companies, which are largely owned by Chinese investors. Strategic investors also own about a third of the capital of firms involved in the mining of cobalt, lithium and copper. For instance, two strategic entities (Chile's Pampa Group and China's Tianqi Lithium) control half the capital of Sociedad Química y Minera (SQM), the world's second largest lithium company.

Table 1. Share of strategic investors in CRM mining companies in 2022

	China	US	EU	UK	Canada	Australia	Latin America	Africa	Total
REE	86%	12%	0%	0%	0%	4%	0%	0%	62%
Nickel	0%	0%	80%	10%	0%	38%	2%	18%	25%
Lithium	77%	0%	0%	6%	0%	0%	67%	9%	34%
Copper	100%	0%	0%	1%	0%	37%	100%	0%	31%
Cobalt	48%	0%	93%	3%	0%	99%	2%	0%	41%
Total	75%	1%	75%	5%	0%	46%	59%	12%	33%

Note: Strategic investors account for 86% of Chinese investors' holdings in the rare earths sector. Strategic investors account for 62% of all investors' holdings in the rare earths sector.

Sources: Refinitiv and authors' calculations.

Caveats

Several caveats should be borne in mind when interpreting our results:

- ownership is rarely identified for all shares. Indeed, the percentage of investors for whom information on ownership is available varies from company to company as well as over time.
- information on the ultimate owners of shares is not available. Hence, our estimates are a proxy of the geographical distribution of shareholders.
- the heterogeneity of shareholders should be taken into account when inferring geopolitical risks from ownership data. While we can assume that strategic entities such as SOEs are aligned with the geopolitical stance of the home country, this is not necessarily the case for individual shareholders.

Despite these limitations, our database provides an overview of ownership interests in listed CRM companies, against a backdrop of increasing geopolitical risks.

Conclusions and policy implications

The EU's CRM Act aims to reduce strategic dependencies by diversifying the EU's supplies. However, it does not address vulnerabilities associated with the concentration of capital. Indeed, the CRM Act sets diversification targets at producer country level. Such targets do not address concentration risks linked to capital ownership. Assessing concentration in the mining sector through shareholdings data shows a very different picture compared with the geographical mine location. Hence, our database could be useful for identifying vulnerabilities linked to capital ownership and for refining the diversification targets set by the EU.

The CRM Act also aims to improve the EU's capacities for the extraction, processing and recycling of critical raw materials. Developing the European mining industry will require substantial funding from private sources (Hache and Normand, 2024). In light of the EU's commitment to strengthen its economic security, assessing the sources of control of European mining companies is paramount for gauging supply and geopolitical risks within the EU. Against this background, our results suggests a need for increased transparency regarding the sources of control of new mining projects announced in the EU. Overall, our analysis highlights the need to enhance the EU's strategic autonomy and suggests the need for a metal-specific strategy. In particular, our database could be instrumental in guiding investment decisions, should European entities seek to increase their shareholdings in major CRM firms. ■

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