Geopolitical Shocks and Inflation: Access to Critical Raw Materials

By Beata Javorcik and Helena Schweiger[1]

Abstract

The success of green transition will crucially depend on the rapid rollout of clean technologies, many of which rely heavily on various critical raw materials. The production and processing of many of these materials is currently dominated by China. Mounting geopolitical tensions and proliferation of export restrictions raise concerns about the security of their supply. Although the process of diversification of the supply base has already started, it will take time and require significant investments. During that time, raw material markets may become a source of inflationary shocks, particularly if there is further escalation of trade tensions.

1 Green and digital technologies rely on many critical raw materials

Production of green energy requires many critical raw materials, including copper for wiring, steel for wind turbine towers, rare earth elements for electric motors, lithium, nickel and graphite for batteries and silicon for solar photovoltaic panels. The amounts involved are often several times larger than those required for generation of conventional energy (see Chart 1).

Obtaining sufficient amounts of these materials to keep the process of green transition on track will necessitate large-scale investments in mining and refining capacity. Concerns about access to critical raw materials are not new. Already in 1977, the Council of European Community noted the Community's dependence on raw materials imports and issued a call for action. And in 2008, the European Commission adopted the Raw Materials Initiative aiming to improve access to raw materials. China, India and the United States took action as well.[2]

What a country defines as a critical raw material depends on its development priorities and industry needs, thus the lists differ across countries. Only a few countries published such lists prior to 2020. However, the supply chain disruptions caused by the COVID-19 pandemic, Russia's war on Ukraine and growing

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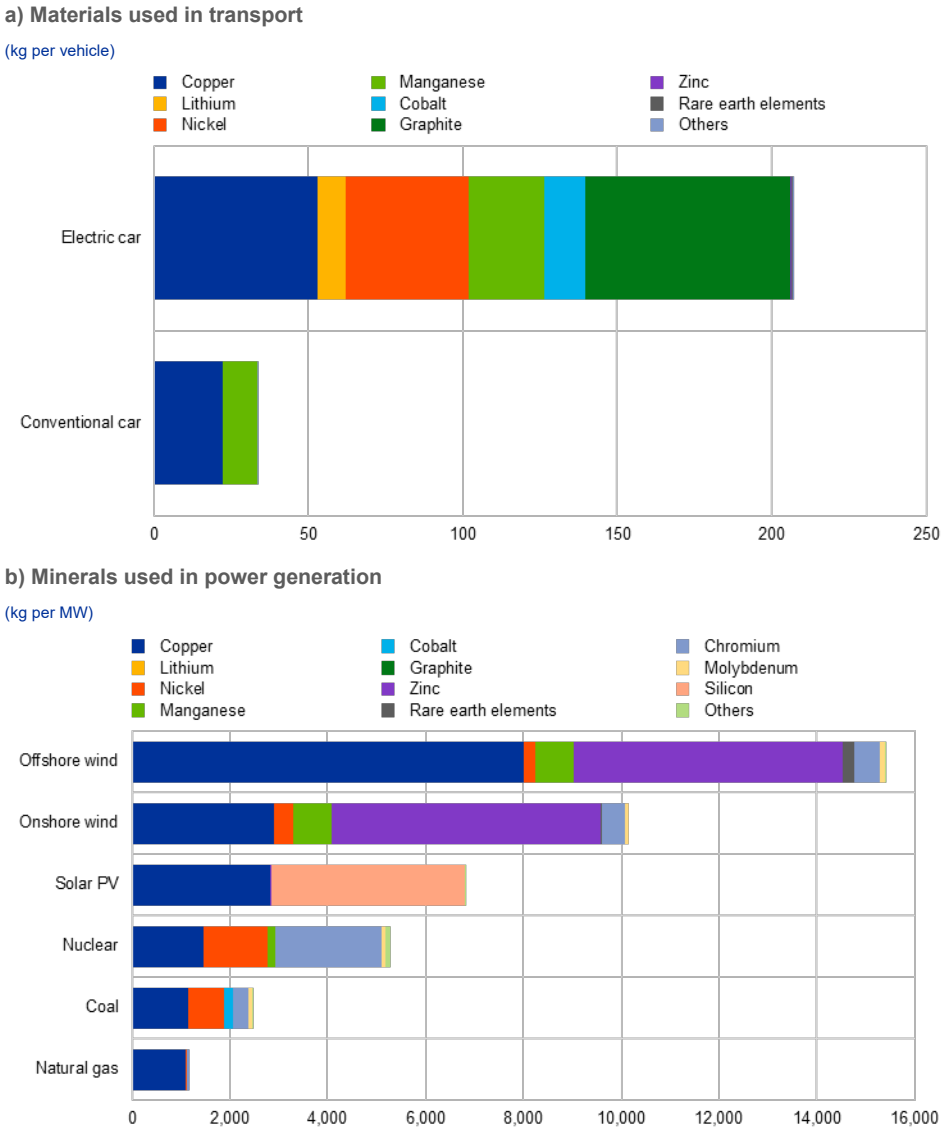
[1] Beata Javorcik is the Chief Economist of the European Bank for Reconstruction and Development (EBRD) and Professor of Economics at the University of Oxford. Helena Schweiger is a Lead Research Economist at the EBRD Office of the Chief Economist. This article draws on the EBRD *Transition Report 2023-24: Transitions Big and Small.*

[2] See, for example, National Plan for Mineral Resources, Righetti and Rizos (2023), and Gupta et al. (2016).

geopolitical tensions have prompted many others to follow.[3] In this chapter, we define a raw material as critical if it is on either the International Energy Agency (IEA) list or in the proposed (and as of 2024, adopted) European Critical Raw Materials Act.[4]

Chart 1

Green and digital technologies rely on many critical raw materials



Sources: IEA (2022).

2 Production of critical raw materials is highly concentrated

Production of critical raw materials is highly concentrated, according to the detailed country-level production data for 2021, which is the most recent year for which this

[3] See IEA (2022).

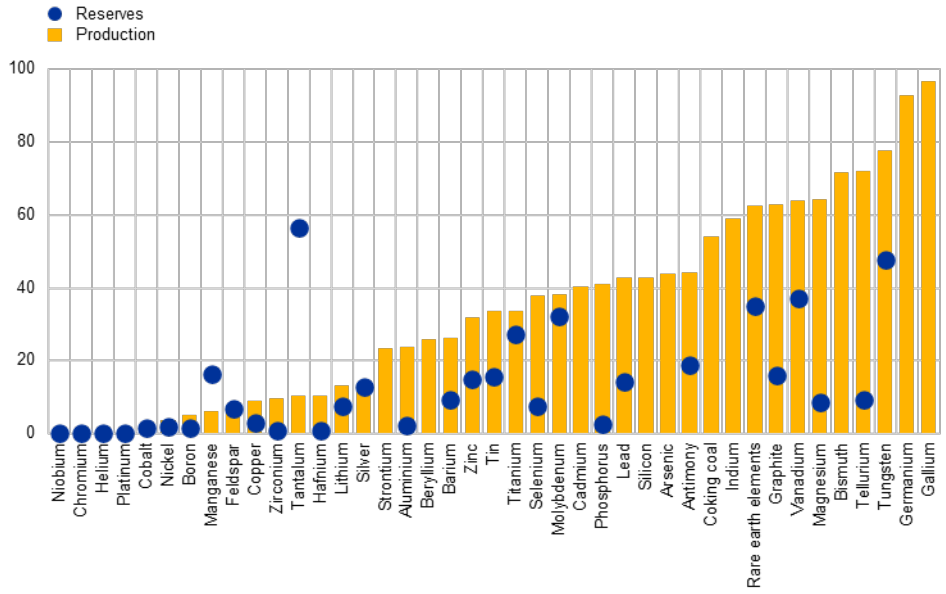
[4] See IEA (2021), p. 248, and European Commission (2023), section 1 in Annexes I and II, respectively.

information is available. As illustrated in Chart 2, China dominates the production of most critical raw materials, accounting for more than 90 per cent of production of germanium and gallium and almost two-thirds of production of rare earths and graphite. Other major producers of critical raw materials include Brazil (accounting for more than 90 per cent of niobium production), the United States (responsible for almost two-thirds of production of beryllium, an important input in the aerospace and defence industries) and the Democratic Republic of Congo (supplying almost 70 per cent of cobalt, which is used in rechargeable batteries).

Chart 2

Production of critical raw materials is concentrated in a handful of countries, notably China

(China's percentage of global production and reserves)



Sources: EBRD (2023, chart 2.4).
Notes: “Platinum” refers to the platinum group of metals.

3 Mounting geopolitical tensions raise concerns about the security of supply of critical raw materials

If a country does not possess critical raw materials within its territory, firms located in that country may seek to acquire foreign mines. As the scramble for resources has intensified, major mining companies have strived to explore foreign deposits and buy mines abroad. According to the data from Standard & Poors (S&P), companies headquartered in the United States and Canada have the most mines overseas. Over the past decade, Chinese companies have also been actively buying overseas mines. In Africa, where about 30 per cent of all known mineral resources are located, the number of Chinese-owned mines has doubled since 2013. Importing raw materials from reliable trading partners or geopolitical allies is an alternative strategy.

The expected success of the above strategies depends on the share of raw material reserves that belong to a given country and its allies.[5] EBRD (2023) examined the share of known reserves located in western countries and their allies. To do so, it used the data on reserves in 2022 from the US Geological Survey (USGS), mapped to the critical mineral list.[6]

To split countries into geopolitical blocs, the analysis used votes cast by each country in the UN General Assembly between 2014 and 2021. Based on similarity of those votes, countries were allocated into two blocs.[7] The first one includes countries that are more closely aligned with the United States and other western economies (listed in notes accompanying Chart 3) while the second bloc encompasses the rest of the world (including China).

Although many raw materials that are critical for the green transition can in principle be sourced from within Bloc 1 - the “West” bloc politically aligned countries, Bloc 2 dominates the known reserves of chromium, platinum group metals, tungsten, phosphorus and rare earths, just to name a few. It also controls a very significant portion of reserves of cobalt, copper, graphite and nickel (see Chart 3).

5 Though it is worth keeping in mind that reserves are dynamic as they depend on the exploration efforts.

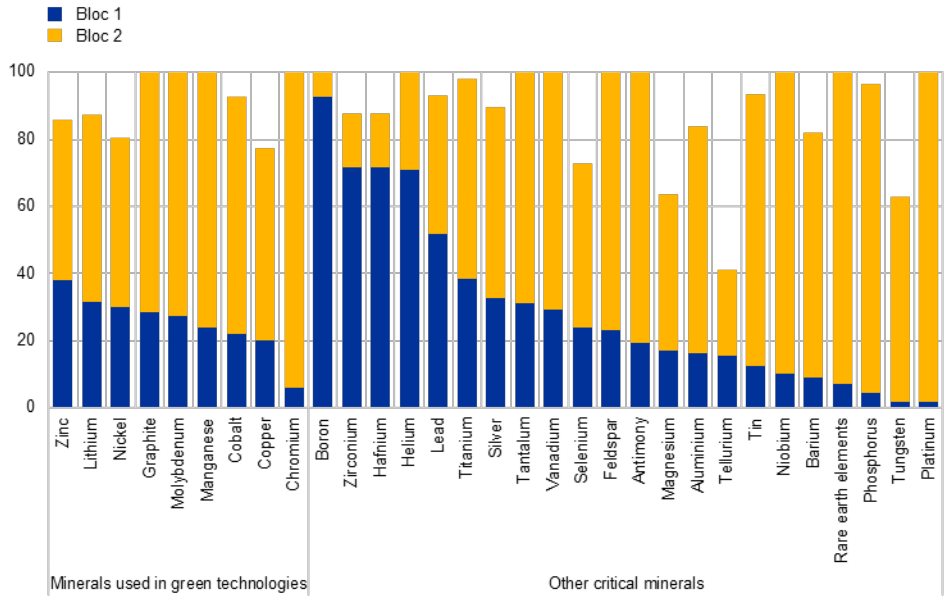
6 For a full description see EBRD (2023, Box 2.1).

7 Following Bailey et al. (2017), 2017), countries are divided into blocs on the basis of (i) average ideal points on a unidimensional scale and (ii) the Jenks natural breaks classification method, with two clusters.

Chart 3

Mounting geopolitical tensions raise concerns about the security of supply of critical raw materials

(share of global reserves, 2022 (per cent))



Sources: EBRD (2023, chart 2.8).
Notes: Based on the location of mines. Bloc 1 consists of countries that are more closely aligned with Western economies and comprises Albania, Andorra, Australia, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Canada, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, the Marshall Islands, Micronesia, Moldova, Monaco, Montenegro, Nauru, the Netherlands, New Zealand, North Macedonia, Norway, Palau, Poland, Portugal, Romania, San Marino, Serbia, the Slovak Republic, Slovenia, South Korea, Spain, Sweden, Switzerland, Türkiye, Ukraine, the United Kingdom and the United States. Bloc 2 contains all other economies.

4 Export restrictions on critical raw materials have increased substantially

An increase in demand for critical raw materials observed in recent years, has been accompanied by a growing share of critical products that are subject to export restrictions, with the export restrictions shooting up starting in 2020 (see EBRD, 2023).

The economic importance of these developments can be assessed based on the data on export restrictions taken from the Global Trade Alert (July 2024 version) combined with data on international trade flows.[8] As export restriction by design limit export flows, Chart 4 depicts the share of 2017 exports that were subject to such restrictions in 2017 and in 2023.[9] As clearly visible in the chart, on average the share of exports under restrictions increased from 14.6 per cent to 24.9 per cent during that period.

8 See Evenett and Fritz (2020) for a discussion of data on export restrictions.

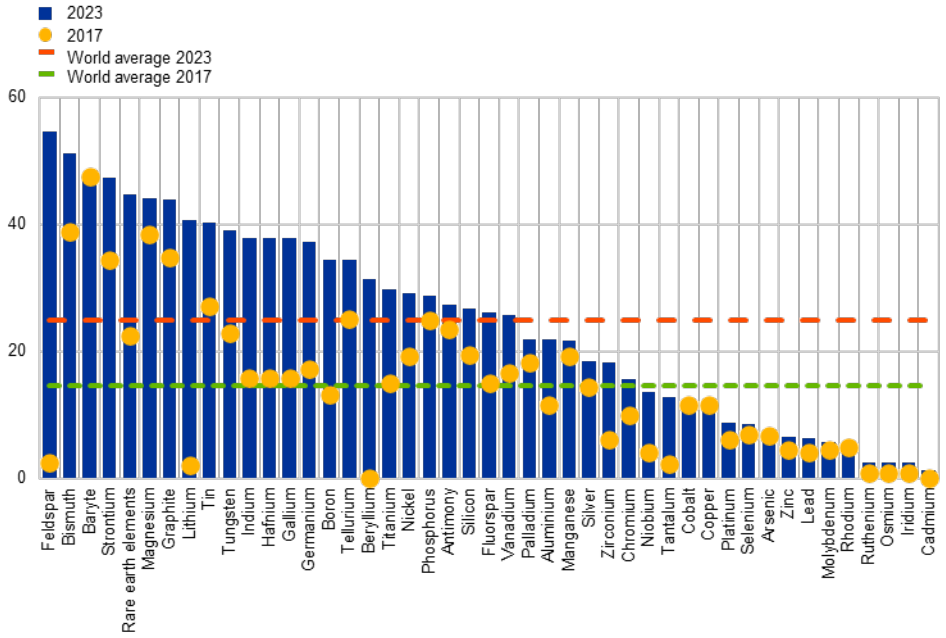
9 Names of critical raw materials were manually assigned to relevant HS6 codes. For example, manganese ore (260200), manganese dioxide (282010), manganese articles, waste and scrap (811100), and bars and rods of silico-manganese steel (722820) were all classified as manganese. See EBRD (2023, Box 2.1).

The biggest increases in the percentage of critical materials that are subject to export restrictions have been observed in the United States, Vietnam and China. Notable increases have been observed for lithium, beryllium and rare earth elements. While some export restrictions are motivated by the desire to export higher value-added products, others may be politically motivated. For instance, China restricted exports of gallium and germanium in response to the US CHIPS Act restricting flows of American technology to China. More recently, following growing tensions with the United States, China announced restrictions on exports of graphite.

Chart 4

Export restrictions on critical raw materials have increased substantially

(percentage of exports subject to export restrictions, baseline year: 2017)



Sources: Global Trade Alert (as of 24 June 2024), UN Comtrade, and authors' calculations. See EBRD (2023, Box 2.1 for the list of critical raw materials).

5 Why does it matter for central banks?

Going forward, access to critical raw materials may become a source of inflationary shocks, particularly as geopolitical tensions are on the rise. Export restrictions can be introduced quickly, at the stroke of a pen, while developing alternative supplies of raw materials is a slow process. Developing a new mine requires substantial investment, takes a long time and requires obtaining various permits and addressing potential legal challenges related to the social and environmental impacts of mining. For instance, LKAB, a state-owned Swedish mining company, announced the discovery of a large deposit of rare earth elements in Kiruna, Sweden and estimated that it will take at least 10-15 years before the mining can start.[10]

[10] See Europe's largest deposit of rare earth metals located in Kiruna area, last accessed on 8 August 2023.

There is also a lot of uncertainty about the impact of innovation on the demand for raw materials. Long investment lags increase the risks associated with mining projects given that demand for certain minerals can change quickly as technology evolves or alternative supplies come on stream. For example, 60 per cent of China's electric vehicles are estimated to use cobalt-free batteries in 2023, up from 18 per cent in 2020.[11]

One thing is certain though, keeping an eye on the markets for critical raw materials will serve central banks well.

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[11] See Hook et al. (2023).