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EU Investment Treaties in the Geoeconomic Competition for EV Minerals

Henrik Horn

Research Institute of Industrial Economics
P.O. Box 55665
SE-102 15 Stockholm, Sweden
info@ifn.se
www.ifn.se

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Henrik Horn *

Research Institute of Industrial Economics (IFN), Stockholm
Centre for Economic Policy Research, London

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Address: Research Institute of Industrial Economics (IFN); Box 55665; SE-102 15 Stockholm; Sweden. Email: henrik.horn@ifn.se.

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Abstract

EU member state investment treaties have been criticized for potentially deterring EU countries from pursuing desirable policy measures. This paper explores whether these treaties can nonetheless serve a beneficial geoeconomic function for the EU by safeguarding EU investments in five minerals critical to electric vehicle production. It is found that the treaty coverage provided by EU member states treaties ranges from minimal to moderately broad. While EU investments are, on average, better protected under these treaties than US investments are under corresponding US agreements, Chinese investments benefit from substantially broader—and likely stronger—protection. Moreover, China possesses significant domestic reserves of several of these key minerals. Overall, the existing network of EU member state investment treaties offers limited support for the EU's geoeconomic positioning vis-à-vis China.

Keywords: International investment agreements, investment treaties, strategic minerals
JEL Codes: F52, F21, K33, Q34

1 Introduction

Access to essential raw materials has recently become a widespread concern among countries. In 2024, the European Union (EU) adopted the Critical Raw Materials Act (CRMA), with the aim of

> "... establishing a framework to ensure the Union's access to a secure, resilient and sustainable supply of critical raw materials..." (Art. 1, EU (2024).)

The CRMA outlines a range of measures to enhance the EU's access to critical and strategic raw materials.[1] It also emphasizes the need to increase private investment in the extraction, processing, and recycling of these materials. The urgency of improving access to critical raw materials is echoed in the recent "Draghi report," which states:

> [t]he EU needs to develop a genuine "foreign economic policy" based on securing critical resources... The report recommends complementing [the CRMA] with a comprehensive strategy covering all stages of the critical mineral supply chain.[2]

Despite the emphasis on investment protection for critical raw materials, the debate appears to have overlooked the potential role of the primary legal instrument for protecting foreign investment—*investment treaties*. EU member states are parties to over 1,000 bilateral investment treaties with third countries. These treaties can, depending on interpretation, protect investments from a wide range of host country measures that might adversely affect profitability.[3]

The investment treaty regime has faced significant criticism, both concerning the effects of the treaties and the quality of arbitral jurisprudence.[4] Much criticism has also been directed at the Investor-State Dispute Settlement (ISDS) mechanisms included in most of these treaties, which allow investors to bring claims against host states for alleged violations. The treaties are often said to lead to excessive compensation payments to investors, and to deter governments from pursuing desirable regulatory measures—so-called "regulatory chill." Even the largest economies have reportedly experienced such effects. According to Robert Lighthizer, U.S. Trade Representative during the first Trump Administration:

[1] The Act defines critical raw materials as being economically important to the EU, and at high risk of supply disruption. Strategic raw materials, which for the most part also are critical, are essential for the green and digital transitions, defense and space applications, and they are expected to have sharply rising demand. For detailed information regarding the EU's strategic and critical raw materials activities, see `https://single-market-economy.ec.europa.eu/sectors/raw-materials/areas-specific-interest/critical-raw-materials_en`.

[2] Draghi (2024).

[3] An alternative—and in many respects similar—form of investment protection in mining is the inclusion of stabilization provisions in contracts or in the domestic laws of host countries. These provisions protect investors from measures enacted by host countries after the investment has been made.

[4] See e.g. Boyd (2023) for a scathing criticism of the legal regime, and Brauch et al. (2024) for a call for EU member states to give up their bilateral treaties with third countries.

> ...More importantly, we had situations where real regulation which should be in place, which is bipartisan and in everybody's interest, has not been put in place for fears of ISDS...[5]

The starting point of the paper is the notion that the effects that investment treaties that are criticized for in the debate, might potentially have beneficial *geoeconomic* implications for the EU, by *protecting EU investments in critical raw materials*. Specifically, the paper investigates the extent to which EU member state bilateral investment treaties provide protection for investments in reserves of five minerals critical to electric vehicle (EV) production: cobalt, lithium, manganese, natural graphite, and nickel. These minerals are also of vital importance to the defense industry.[6] The paper also compares the extent of treaty-based protection available to EU investors with that enjoyed by the EU's main strategic competitors from their investment treaties.

By focusing on investments in *reserves*, this study adopts a longer-term perspective than is typical in current policy discussions, which often rely on current production and consumption figures. Reserves are, by definition, commercially viable under existing technological and market conditions. While an even longer-term outlook could consider mineral resources more broadly, we refrain from doing so due to the substantial uncertainty around the commercial and technical feasibility of extracting those resources, as well as the potential for material substitution and technological change.

It is assumed that the EU faces two principal strategic competitors in access to the minerals under study. The first is China, the world's largest producer of electric vehicles and a country with significant domestic reserves of several of these minerals.[7] The second is the United States, which until recently was seen as a partner to the EU in securing access to critical raw materials. In 2022, for example, the EU and US co-launched the Minerals Security Partnership to catalyze global investment in critical mineral supply chains, especially for EVs and advanced batteries.[8] However, the aggressive unilateral posture of the second Trump Administration has positioned the US as a direct competitor. Reports suggest the US has threatened to occupy territory of a NATO ally to secure mineral access, requested that Ukraine cede half of its critical mineral reserves, and entered bilateral negotiations with the Democratic Republic of Congo regarding access to its minerals.[9]

[5] Statement made regarding the renegotiation of NAFTA before the House Ways and Means Committee on March 21, 2018. `https://www.c-span.org/video/?c4719932/brady-lighthizer-isds-discussion`.

[6] Girardi et al. (2023) provide a detailed analysis of the role of a large number of minerals for the European defence industry.

[7] Chinese companies are also investing heavily in the world's minerals. In 2023 Chinese firms invested around USD 16 billion in mines overseas, not including minority investments, the highest figure in a decade. Chinese-owned entities outside China account for over 40 percent of the global supply of cobalt, more than a quarter of the supply of mined lithium, and around one third of the global supply of nickel. "China is tightening its grip on the world's minerals", The Economist 31 October 2024.

[8] `https://www.state.gov/minerals-security-partnership/`.

[9] "US in exploratory talks with DR Congo over mineral deal", Financial Times, 8 March 2025.

The analysis will be based on three main assumptions. First, reserves located in China or the US are presumed inaccessible to EU investors—indeed, this inaccessibility is a defining feature of the current geoeconomic rivalry. The same applies to reserves in Russia or North Korea due to the EU's hostile relations with these countries. Thus, the focus is on reserves in the remaining countries, which are referred to as *open* reserves.

Second, for each mineral and country, the paper computes treaty *coverage* indexes, measuring the open reserves covered by bilateral investment treaties. For China and the US, this calculation is straightforward. It is more unclear how to assess the *aggregate* coverage for the EU, since it stems from EU member states' bilateral treaties. To this end the paper will for each mineral calculate an index that takes into account both the shares of global open reserves that are located in the open reserve countries with which EU member states have treaties, and the size of the EU countries that have treaties with the open reserve countries, since this will affect the share of EU investment capacity that is covered by the treaties. To account for the latter aspect, it will be assumed that EU member states' shares of EU gross domestic product (GDP) reflect their relative investment capacities.

Third, while most investment treaties share basic features, their actual strength in protecting investors can vary significantly. The criticism regarding regulatory chill has been made in particular with regard to treaties that combine vaguely drafted substantive provisions with a lack of carve-outs or exceptions for host country regulatory measures. The paper will specify a range of specific drafting features that must be fulfilled for the treaties to be classified as *protective* in this regard. These requirements are quite demanding, so these agreements should have significant scope relative to other treaties to be interpreted in investor-friendly fashion.

To examine the coverage of the EU member state treaties, and to compare it with the coverage from Chinese and US treaties, the paper will employ a data set comprising all bilateral treaties between these countries and third countries that the UNCTAD International Investment Agreement Navigator reports as being in force. This data set thus includes 1 053 bilateral investment treaties with EU member states as parties, 86 Chinese treaties and 30 US treaties, with each treaty classified as either non-protective or protective.

It is found that EU investors generally have weak protection for investments in manganese and nickel reserves, but significantly better protection for investments in lithium in particularly, and in cobalt, with protection for natural graphite falling in between. Compared to US investors, EU investors enjoy somewhat stronger protection in most areas except cobalt. However, the main finding is that China strongly dominates the EU in terms of both treaty coverage and protectiveness, across all five minerals. Furthermore, China has significant domestic reserves of lithium, manganese, and natural graphite.

A fundamental problem of the EU treaty regime is that it is fragmented, since it depends on the treaties of the EU member states, which only apply to the respective EU member state. From a coverage point of view it would be preferable to have treaties at the EU level. It is

argued that the main target for the EU should then be to form a treaty with Australia, which for four of the five minerals have reserves that rank among the three largest among all open reserves.

The rest of the paper is structured as follows. Section 2 briefly discusses how geoeconomic objectives may reshape the role of investment treaties compared to purely commercial motivations. Section 3 formally defines the concepts of treaty coverage, open reserves, and protective treaties, and introduces the data. Section 4 presents the empirical findings on treaty coverage for the five minerals. Section 5 draws some policy conclusions from the findings. Supplementary tables are included in the Appendix.

2 A potential geoeconomic role for investment treaties

The paper examines whether EU investment treaties can serve a function that, to the best of our knowledge, has not yet been addressed in the economic literature. We will therefore first very briefly point some of the conceptual issues that might arise when these treaties operate in a geoeconomic context. We will distinguish between the effects of an investment treaty on a country in its role as a host to protected inward investment, and as a source of protected outward investment.[10]

Host country effects A treaty that stimulates foreign investment may benefit the recipient country through various positive externalities—such as workforce learning-by-doing, an expanded tax base, and increased product market competition. However, for a treaty to attract investment beyond what would otherwise be undertaken, it must provide investors with protection that exceed what they would otherwise enjoy. This enhanced protection can take two primary forms, both of which are costly to the host country:

- *Regulatory chill*: The treaty may deter the host government from enacting policies that could negatively impact foreign investments.
- *Compensation awards:* If the host government proceeds with such policies, the treaty typically allows investors (or their home government) to initiate disputes that may result in requirements to compensate investors.

Two features of these costs should be noted. First, they are expected in a statistical sense. Whether they will materialize will normally depend on whether exogenous events occur that trigger the need for host country policy interventions.

Second, these costs will arise even if the treaty does not lead to additional investment, since the protection applies also to investments that will be undertaken regardless of the treaty. Such

[10] See Horn and Tangerås (2021) for a formal economic analysis of how two countries can negotiate the degree of protection under a joint investment treaty.

concerns are particularly relevant for EU member states. Given the robust legal systems and investor protections already in place in most EU countries, it is unlikely that these countries' treaties substantially boost inward investment. Nonetheless, they may still be used by foreign investors to extract compensation. Spain's experience under the Energy Charter Treaty (ECT) is illustrative: it has faced around 50 disputes and has been ordered to pay approximately EUR 10 billion in compensation. It seems plausible that most of the investments in question would have been undertaken even in the absence of the ECT.[11]

Source country effects Because investment treaties are reciprocal, the above host country effects are only one side of the coin. A treaty also protect a partner country's outward investment. This will increase expected profits of these investment through the same mechanisms that cause the agreement to be costly to a partner country as hosts to inward investment. And in parallel to above, these gains will arise also for investments that would be undertaken regardless of the treaty. As a result, the overall welfare effect of a treaty for a given country depends on the balance between these host and source country effects, which is inherently ambiguous.

The protection from investment treaties might have an additional benefit to source countries in a *geoeconomic* context.[12] The classification of certain raw materials as "critical" suggests that the extraction or production of these materials should yield positive externalities that go beyond private investor returns. This can have several implications for the effects and desirable designs of treaties. For instance:

- A source country government may have *stronger* incentives than a private investor to initiate a dispute, because of the broader geoeconomic values that are at stake.
- A source country government might prefer *restitution* of the pre-violation situation to compensation based on foregone operating profits (as is a standard norm).
- Since an illegal acts deprives the source country of the externalities that the investment in the raw material would have provided, full compensation for foregone operating profits might *not suffice* for implementing the full compensation principle in international law

3 Definitions and data

This section introduces three basic definitions: Section 3.1 defines the concept of open reserves. Section 3.2 defines the index that will be used to measure the extent to which bilateral

[11] One line of criticism against investment treaties holds that investors are often unaware of the existence of the treaties when they invest. It is only after they have suffered harm from policy changes that they are made aware of their existence. If so, the treaties do not promote investment and merely expose host countries to additional costs.

[12] For recent economic analyses of geopolitical and geoeconomic dimensions of trade and investment, see Clayton et al. (2024), Grossman et al. (2024), Mattoo et al. (2024), and Mohr and Trebesch (2024).

investment treaties would cover investments in the open reserves from the EU, China and the US. Section 3.3 defines the notion of protective treaties. Section 3.4 then introduces the data on treaties that will be used throughout the analysis.

3.1 Open reserves

The premise of the paper is that EU is in geoeconomic competition with China and the US for the five minerals that the EU's CRMS classifies as essential for electric vehicles production: cobalt, lithium, manganese, natural graphite, and nickels. To identify the magnitudes of the reserves of these minerals the paper will draw on the authoritative U.S. Geological Survey (2024).[13] It lists the countries where the reserves are located and the estimated volumes of the reserves.

EU investors will be assumed to not have access to reserves in China or the US, nor to reserves in North Korea and Russia due to the frosty general relationships with these countries. Furthermore, for some minerals the U.S. Geological Survey (2024) includes a category "Other countries" without specifying these other countries. It is therefore not possible to determine whether these countries have investment treaties with EU countries, China and the US. The reserves in "Other countries" for most part constitutes a rather small share of the world reserves, as well be seen. If we were to include these reserves in the open reserves, we would tend to underestimate the coverage of the EU countries' treaties, since we would disregard instances where reserves in these "Other countries" are actually covered. If we instead exclude these reserves from the open reserves, we correctly assess the shares for the listed resources countries. But the calculated treaty coverages (to be defined below) do not include to the reserves of "Other countries", and might thus be biased downward somewhat. We choose the latter option. We will consequently focus on the following reserves:

Definition 1 *Reserves of the five above-listed minerals will be denoted as "open" if they are not located in the EU, China, Russia, North Korea, or the US, nor in countries that are subsumed under the category "Other countries" by U.S. Geological Survey (2024).*

It should emphasized that the mere fact that reserves are open in the sense used here does not guarantee that they are available for investments from the EU. For instance, the reserves can already be owned by Chinese companies, which have been actively investing in mining industries across the world. On the other hand, as we will discuss further in the concluding section, the known reserves tend to increase significantly over time, so it is possible that investment opportunities might open up over time, in which case the relative degree of protection for EU versus Chinese and US investment from the investment treaty regime will matter.

[13] Strictly speaking, the CRMS refers to "battery grade" for the last four minerals. The U.S. Geological Survey (2024)) does not specify how close the listed reserves are to battery grade, however.

3.2 Treaty coverage

The purpose of the study is to assess the extent to which EU investments in countries with open reserves of the five minerals that the EU has denoted as strategic, would be covered by bilateral treaties, and to compare this with the coverage for Chinese and US investments. For each of the latter two countries, the determination of the coverage is trivial in the sense that either their is a treaty in force with the reserve country in question, in which case the coverage with this country will be said to 100 percent, since the treaty applies to all investments from the partner country. Alternatively, there is no treaty in place, in which case the coverage will be set to 0 percent.

More formally, let $t_{k,r}$ be an indicator variable that takes the value 1 if country k has a treaty with reserve country r, and that otherwise has the value 0. Also, for any mineral, let s_r denote the share of the open reserves that is located in country r. The total treaty coverage for Chinese or US investments for some mineral is then simply the sum of the respective t_{kr} times s_r, with the summation taken over the R countries with open reserves of the mineral:

Definition 2 *For any mineral, the treaty coverages for China, and for the US, are respectively:*

$$C_{CH} \equiv 100 \sum_{r=1}^{R} t_{CH,r} s_r \quad \textit{and} \quad C_{US} \equiv 100 \sum_{r=1}^{R} t_{US,r} s_r. \tag{1}$$

It is more complicated to capture the coverage for the EU as an aggregate, since there is more than one EU country, and the countries vary in economic size, and therefore also in their capacities to invest in the reserves. It would not be meaningful from an aggregate EU perspective to only look at whether or not there are treaties in place, as could be captured by the total number of bilateral treaties for EU member states. For instance, a treaty between Malta and an open reserve country, which will only apply to Maltese investments in the open reserve country, will be of much less importance to the EU as whole, than a treaty between Germany and the open reserve country. It is therefore necessary to somehow take account of the differences in EU member states' capacities to invest in reserve countries. To this end, we will assume that EU countries' shares of EU GDP reflect their relative capacity to invest abroad.

To adapt the coverage definition to the EU setting, let let g_e be the share of EU GDP that comes from EU member state e. The coverage index then becomes:

Definition 3 *For any mineral, the treaty coverage for EU member state e, and for the EU, are respectively:*

$$C_e \equiv 100 \sum_{r=1}^{R} t_{er} g_e s_r \quad \textit{and} \quad C_{EU} \equiv \sum_{e=1}^{27} C_e. \tag{2}$$

The index C_{EU} will take the maximum value 100 if all EU countries have treaties with all of the open reserve countries, and it will be zero if no EU country has a treaty with any open reserve

country for the mineral. In most cases it will be somewhere in between, reflecting that some, but not all, EU member states have treaties with some, but not all, open reserve countries. How much it will then deviate from 100 will depend both on the shares of the total open reserves that the various open reserve countries have, and on the GDP levels of the EU member states that have treaties.

3.2.1 Remarks

The above approach to capture basic features of the EU treaty coverage obviously has weaknesses. First, EU member states differ not only in the sizes of their economies, but also with regard to their industrial structures. For instance, a country without any mining industry will probably have less capacity to invest in mining operations in foreign open reserve countries than a country with a large mining sector, even if they have the same GDP. This has an ambiguous effect on the computed coverage indices, since the impact will depend on how the size of the GDP correlates with the capacity to invest in e.g. mining.

Second, by assuming that investors will only be protected by treaties that their own country is party to, we disregard possibilities for treaty shopping, which is a well-known phenomenon with regard to investment treaties.[14] We might thus tend to underestimate the protection that the EU member state treaties de facto give to the EU in the aggregate.

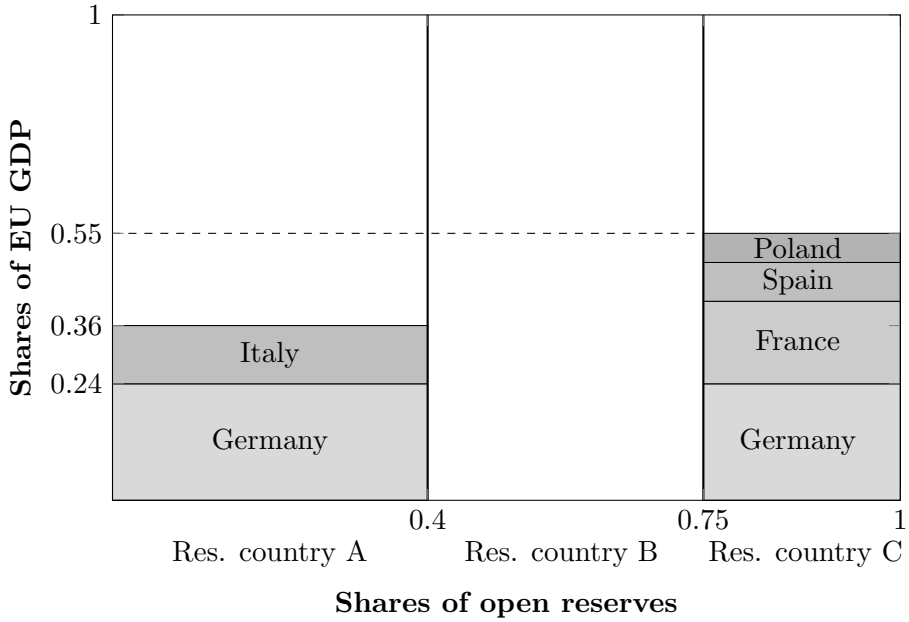
Third, we are assuming that it is meaningful to compare the coverage values for the EU as an aggregate, with the coverage values for China and the US, without accounting for the relative sizes of these economies, and their different investment capacities. It does not seem possible to draw definitive conclusions regarding the bias that this assumption would cause. But it does seem plausible that Chinese investors will get more government support for investments in critical raw materials than would e.g. EU investors, and will therefore be more prone to invest than EU investors, all else equal. If so, the calculated EU coverage indices would tend to exaggerate the protective effect of the EU member state treaties relative to the protection for Chinese investments.

3.2.2 An illustration

To provide some intuition for how the coverage index applies to the EU, Figure 1 illustrates a hypothetical example in which the open reserves are located in three reserves countries, denoted A, B and C. The horizontal axis captures the shares of the open reserves; country A thus has the share .40, country B .35, and country C .25. The vertical axis captures the share of EU GDP for the EU countries with treaties. The whole box hence represents the set of all possible EU investments in all open reserves. The figure illustrates the interaction between the size of

[14] For instance, a German firm invest through an affiliate in the Netherlands, to get access to treaty coverage from Dutch investment treaties.

Figure 1: A hypothetical examples of EU treaty coverage



the reserves that are covered by treaties, which is the horizontal dimension, and the extent to which any reserve is covered by EU country treaties, the vertical dimension.

In this example, there are treaties between reserve country A and Germany (which accounts for the share .24 of EU GDP), and Italy (.12), implying that the fraction .36 of the EU investment capacity would have protection. There is no treaty with reserve country B. But there are treaties between reserve country C and Germany (.24), France (.17), Spain (.08), and Poland (.06), implying that the fraction .55 of EU investment capacity is covered for country C. Since reserve country A has the share .40 of the open reserves, and reserve country C has the share .25, the total coverage for the EU member state treaties is 100*(.40 x .36 + .25 x .55), which is equal to slightly more than 28; the multiplication by 100 is only done for expositional convenience. In terms of the figure, if all EU states would have had treaties with all three reserve countries, then the whole figure would have been filled. The white areas thus represents the share of EU investment capacity that is not covered by a treaty.[15]

3.3 Treaty protectiveness

Investment treaties typically share many features, to the extent that they sometimes are referred to as "boiler plate" agreements.[16] But they can still differ in their potentials to protect

[15]Since all Chinese or US investment capacity would be covered in case of a treaty, the corresponding figure for these countries would have staples with the height 100 for the reserve countries with which they have treaties, and no staple in the other cases.

[16]Dolzer et al. (2022) provide a useful overview of legal aspects of investment treaties.

investments and investors. It would therefore be useful if one could distinguish between treaties according to how protective of investor interests they are. This is not an easy task, however. The main reason is that there are endless many situations in which a treaty might be invoked, so it would be impossible examine all possible scenarios. A second reason is that the extent of protection that any particular treaty will yield will be at the discretion of the panels that are constituted to arbitrate complaints under the treaty. A common criticism against the investment treaty regime is that panels are inconsistent in their interpretations of the agreements. It is therefore difficult for to predict exactly when a treaty will or will not be found to violate some particular measure. Third, EU member states, China and the US have several hundred of investment treaties with open reserve countries for the five minerals we are focusing on. It would be a very time-consuming task to examine each of these agreements individually. Consequently, it is not feasible to unambiguously rank treaties according to the degree of protection they give.

In the analysis to follow we will adopt a simpler approach. We will assume that agreements with the following features are likely to have *more potential* for protecting investor interests than agreements lacking these features:

- They include the amorphous substantive provisions fair and equitable treatment (FET), and indirect expropriation.
- They do not include carve-outs and exceptions clauses that limit the scope of these substantive provisions.

To identify actual treaties with such features we will draw on the mapping of the contents of a very large number of bilateral investment treaties that UNCTAD has undertaken jointly with a many universities.[17] Approximately 100 features of each agreement have been classified in this project. We will use 16 of these features to identify treaties that are likely to be particularly beneficial for investors:

Definition 4 *An agreement that fulfills all 16 criteria specified in Table 1 will be denoted as "protective".*

Before making some remarks on the choice of these criteria, let us just note that there are obviously many ways in which one might seek to capture qualitative features of treaties that are likely to be advantageous for investors. While we do believe that the approach taken here yields some insight, it should be noted that the main observations in the paper do not hinge on our particular notion of protective treaties.

[17]The mappings are available on the UNCTAD website: `https://investmentpolicy.unctad.org/international-investment-agreements`.

3.3.1 Substantive obligations

There are several reason to focus on agreements that include FET and indirect expropriation. First, as reported in Horn et al. (2024), for the 216 disputes for which the UNCTAD Investment Dispute Settlement Navigator provides information on arbitration panel findings, the most common breaches concern fair and equitable treatment (136 cases) and indirect expropriation (66 cases).[18] [19] Second, these two substantive provisions have been particularly criticized in the policy debate for allowing highly investor-friendly interpretations. Well-known examples are the arbitration panel findings in Tecmed v. Mexico, and in Metalclad v. Mexico.[20] Third, FET in particular, but also indirect expropriation, are among the clauses that have been most thoroughly reformulated in modern treaties. This has been done to reduce the scope for arbitration panels to make expansive interpretations of the ambits of these clauses. For instance, strict limitations are imposed on the scope of the FET clause in the Canada-EU Comprehensive Economic and Trade Agreement.

It should be noted that treaties that include substantive provisions *beyond* FET and indirect expropriation will also be denoted as protective. Indeed, virtually all actual treaties that will be classified as protective also include other substantive provisions. One could of course require that additional substantive provisions are also included for a treaty to be denoted as protective. But this would have the undesirable consequence that agreements that include both FET and indirect expropriation provisions, but lack these additional substantive provisions, would not be denoted as protective. Less clear is whether to require that treaties include *both* FET and indirect expropriation, to potentially qualify as protective. We include both provisions however, to somewhat limit the number of protective treaties.[21]

We do not include pre-establishment protection among the 16 criteria, despite the protection it might add for the same reason that we exclude other additional substantive obligations: it would imply that treaties that lack pre-establishment protection but include FET and indirect expropriation, would not be classified as protective. This would dramatically reduce the number of protective treaties, in light of the rarity of EU member state treaties that include all three

[18] `https://investmentpolicy.unctad.org/investment-dispute-settlement` accessed 25 October 2024.

[19] One or both of these provisions were found to be violated in 163 disputes. In contrast, violations of direct expropriation were found in 48 disputes; arbitrary, unreasonable and/or discriminatory measures in 45 cases (in most cases with breach of fair and equitable treatment); of full protection and security in 25 disputes (in most cases with breach of fair and equitable treatment); of national treatment in 10 cases; and of most-favored nation in five cases.

[20] Another indication of the amorphous nature of FET is provided in Schmidl (2021), where the reasoning by arbitration panels in 28 Energy Charter Treaty disputes are compared. Despite the fact that the disputes concern largely the same type of government measures, the panels reason in three distinct ways, partly resulting in different outcomes of the disputes.

[21] Direct expropriation provisions are always part of agreements that include indirect expropriation, so all of our protective agreements also have direct expropriation clauses. But excluded from the set of protective agreements are agreements that only include direct expropriation (with or without FET), for the same reason that we required both indirect expropriation to complement FET above.

substantive provisions.[22]

Table 1: Criteria for a treaty to be defined as protective

1	Unqualified FET is included.
2	Indirect expropriation is mentioned.
3	No reference to international law regarding FET.
4	No listing of elements applicable to FET.
5	Indirect expropriation is not defined.
6	There is no carve-out for general regulatory measures applicable to indirect expropriation.
7	The preamble does not include any reference to right to regulate (e.g. regulatory autonomy, policy space, flexibility to introduce new regulations).
8	The preamble does not include any reference to environmental aspects.
9	There is no mentioning of health and environment in the text (except in preamble).
10	There is no mentioning of right to regulate (except in preamble).
11	There are no public policy exceptions for health and environment.
12	Essential security exception not included.
13	ISDS is included.
14	There are no limitations of provisions subject to ISDS.
15	No policy areas are excluded from ISDS.
16	The sunset period is 10 years or longer.

3.3.2 Carve-outs

The reach of the substantive provisions can be curtailed by carve-outs and exception clauses. For instance, it seems plausible that host countries would be able to restrict mineral extraction with reference to adverse environmental or health impacts. The right to regulate regarding such matters can be stipulated in preambles, or in the main text, although preambles are often given less weight by arbitration panels. Of particular relevance for strategic minerals would be clauses that allow host countries to protect *essential security interests*.[23] To capture the lack of such carve-outs from the ambit of the two substantive provisions, we require that the treaties fulfill conditions 3-12 in Table 1.

[22] Pre-investment protection often come through National Treatment or Most-Favored Nation provisions. It is found mainly in Finnish and some East-European treaties, some of which with the US. These treaties would not weigh heavily in the calculated coverage indices in light of the economic size of these countries, and since US reserves are not included among open reserves.

[23] See e.g. Rojas Elgueta and Mauro (2020), Voon and Merriman (2023), and UNCTAD (2019), for overviews and discussions of the legality of investment screening for essential security purposes under investment treaties. Wagner (2024) discusses the recent case law on security exceptions.

3.3.3 Investor-state dispute settlement

ISDS is normally seen as essential to the protection that investment treaties provide, since source country governments are likely to be less inclined to pursue disputes than investors. But as discussed above, for the present issue ISDS might be less important. Investments with geoeconomic value will by definition have benefits that go beyond the private commercial gains that they generate. There should therefore be stronger incentives for source country governments to pursue disputes regarding such investments than when there are only commercial interests at stake. It might therefore suffice that a treaty only allows for state-state dispute settlement. But the inclusion of ISDS should still add credibility to the enforcement, for instance since source countries might refrain from pursuing disputes for political reasons. We therefore include unconstrained ISDS as a requirement for a treaty to be denoted protective. As it turns out, this does not have any significant quantitative impact however, since the vast majority of the treaties include ISDS.[24]

3.3.4 Withdrawal and termination

The final criterion that will be employed concerns the conditions for unilateral withdrawals from the treaties. The agreements typically continue to apply for extended sunset periods if either party withdraws unilaterally. If this period is short, the agreement need not be very constraining despite other constraining features. We therefore require a sunset period of at least 10 years.

3.4 The distribution of treaties across countries

We will now apply the above definitions to actual investment treaties. We use the UNCTAD International Investment Agreement Navigator to identify 1 180 bilateral investment treaties in force for EU27 member states, China and the US, excluding agreements between these countries.[25] To characterize the protectiveness of these agreements, we use the above-mentioned UNCTAD mapping of the contents of investment treaties to classify the agreements according to whether they are protective, or non-protective.

Some adjustments have been made with regard to the data. First, there are 175 treaties for which the UNCTAD website does not provide any mapping of the contents. We will assume that these treaties are non-protective. Second, we treat Belgium and Luxembourg as one country, since almost all of their treaties are through their economic union BLEU.[26]

[24] For the open reserve countries to be identified below, only German treaties with Congo (Dem.), Papua New Guinea, Tanzania and Turkiye, and a Swedish treaty with Madagascar, lack ISDS.

[25] https://investmentpolicy.unctad.org/international-investment-agreements. Data downloaded 7 February 2025.

[26] Both countries have separate treaties with Belarus, Russia, Tajikistan and Turkmenistan, which are treated as a four BLEU treaties with these countries. And Belgium, but not Luxembourg, has a treaty with Kyrgyzstan, which is also treated as a BLEU treaty.

Third, the downloaded data includes treaties for both China and Hong Kong. We will assume that Chinese investors will be able to rely on Hong Kong treaties, and vice versa; that is, that these investors will be able to undertake a limited form of treaty shopping. They will then presumably use the more protective treaty with any third country, if the treaties differ in protectiveness. To prevent double-counting we thus discard the Hong Kong treaties when China has the same or more protective treaties. This applies to treaties with Canada, Kuwait, Mexico, New Zealand, United Arab Emirate, South Korea and Switzerland. Hong Kong has a protective treaties with Japan, Thailand and United Kingdom, whereas China's treaties are non-protective, so the former treaties are relabeled as Chinese, and replace the three Chinese treaties. And Hong Kong has a non-protective treaty with Chile, but China has none, so this treaty relabeled as Chinese.[27]

As a result of these adjustments we end up with a total of 1 169 treaties involving EU27 member states, China, and the US, each classified as either non-protective or protective.[28] Table 2 provides an overview of the data by specifying the number of treaties per country. A significant proportion of the treaties–43 percent–are classified as protective, despite the stringent requirements for such a classification. For EU member states the share is 45 percent, and for China 40 percent. The US has no protective treaty. One reason is that the FET clause in US treaties is qualified by a reference to international law. The table also suggests a positive relationship between GDP size of EU member states and the number of treaties they have. This will have some impact on the coverage of the EU treaty regime.

[27]Macau only has two treaties in force, both with EU member states, and will thus not enter the analysis.

[28]; Table A.1 lists the 27 treaties with open reserves countries for one or several of the minerals that have not been mapped by UNCTAD, and that thus are assumed to be non-protective.

Table 2: The number of investment treaties in force per country

Country	Non-protective	Protective	SUM
Austria	9	36	45
BLEU	45	14	59
Bulgaria	27	8	35
Croatia	19	6	25
Cyprus	10	6	16
Czechia	28	30	58
Denmark	9	28	37
Estonia	9	3	12
Finland	31	22	53
France	78	4	82
Germany	71	41	112
Greece	6	21	27
Hungary	15	24	39
Italy	39	11	50
Latvia	14	5	19
Lithuania	9	21	30
Malta	4	4	8
Netherlands	24	47	71
Poland	16	18	34
Portugal	7	26	33
Romania	26	25	51
Slovakia	16	16	32
Slovenia	7	8	15
Spain	38	21	59
Sweden	24	27	51
SUM	581	472	1053
China	52	34	86
US	30		30

4 Treaty coverages for each of the minerals

We will now use the above definitions and data to examine the coverage of EU member states' bilateral investment treaties for each of the five minerals that the EU has classified as strategic for electric vehicles production, and compare this coverage to the treaty coverage for Chinese and US investors.

For each mineral we will first determine the share of the world reserves that are open, and the distribution of these reserves across countries. We will then compute the contribution to the aggregate EU coverage from individual EU member states, to identify the main sources of the strengths and weaknesses of the EU investment treaty regime; the full results for the disaggregation of the EU treaty coverage are reported in the Appendix. Finally, we compare the aggregate EU coverage to the coverage for Chinese and for US treaties. These analyses mineral by mineral will be used in the ensuing Section 5 to draw some broader conclusions regarding the EU member state treaty regime.

4.1 Cobalt

Table 3 gives the distribution of the world reserves of cobalt.[29] Most of the reserves are open. There are additionally seven percent that U.S. Geological Survey (2024) lists as located in "Other countries", which thus potentially could be available for EU investment as well. EU's strategic competitors only have very small reserves.

Table 3: Distribution of cobalt reserves

World reserves:		**Open reserves:**	
Open reserves	0.90	Congo (Dem.)	0.64
Other countries	0.07	Australia	0.18
Russia	0.02	Cuba	0.05
United States	0.01	Indonesia	0.05
		Philippines	0.03
		Canada	0.02
		Madagascar	0.01
		Turkiye	0.01
		Papua New Guinea	0.01

The distribution of the open reserves across countries is given in the second column of Table 3.[30] Congo (Dem.) dominates heavily with almost two-thirds of the open reserves, more than three times the reserves in Australia, the next to largest holder of open reserves.[31] Congo (Dem.) and Australia hence jointly account for over 80 percent of the open reserves.

Based on the treaty coverage definitions introduced in Section 3.2, Table 4 shows each EU member state's contributes to the aggregate EU coverage, and Table A.2 in the Appendix breaks down these contributions to treaty level.[32] The aggregate coverage for the EU investment capacity is just over 39 percent. Most of the coverage stems from two agreements with Congo (Dem.). Germany has an agreement from 1971. It is not protective, partly since it does not allow for ISDS, only state-state dispute settlement.[33] This would normally appear to be a major constraint on the bite of an agreement. But, as noted above, due to the geoeconomic aspect of these reserves, there might be an interest at a German government level in enforcing the agreement. The other major agreement is with France. This protective agreement accounts for two-thirds of the EU coverage from protective agreements for cobalt. There is also a non-protective treaty between BLEU (Belgium and Luxembourg) and Congo (Dem.), which is unusual in that it went into force 2021, 16 years after it was signed.[34]

[29]Here and below the shares do not always sum to unity since there is a discrepancy in the U.S. Geological Survey (2024) data between the stated reserves of the various countries, and the stated world reserves, and sometimes smaller discrepancies stem from rounding errors

[30]U.S. Geological Survey (2024) also lists New Caledonia, but without providing information regarding its reserves.

[31]Congo (Dem.) dominates even more with regard to world production, accounting for 74 percent in 2023.

[32]Here and below, zeros in tables indicate that the entry is larger than zero but less than .05.

[33]We refer to the year the agreements went into force, unless otherwise stated.

[34]There are also non-ratified treaties with a few EU countries: Greece (signed 1991), Italy (2006), and Portu-

The other reserve country of some significance is Australia, which has just over a quarter of the reserves in Congo (Dem.). EU member states have five non-protective treaties in force with Australia. But since all of these agreements are with smaller countries in terms of GDP (Czechia, Hungary, Lithuania, Poland and Romania), they add less than two percentage points in terms of coverage.

Table 4: EU member state treaty coverage for cobalt (C_m)

	Non-protective	**Protective**	**SUM**
Germany	17.2	0.9	18.2
France	1.7	10.5	12.1
BLEU	2.6	0.1	2.7
Italy	1.1		1.1
Poland	0.4	0.7	1.1
Spain		0.8	0.8
Netherlands	0.1	0.5	0.6
Czechia	0.1	0.4	0.5
Romania	0.1	0.4	0.5
Hungary	0.0	0.3	0.3
Sweden	0.0	0.2	0.3
Austria	0.1	0.1	0.3
Denmark	0.1	0.1	0.2
Finland		0.1	0.1
Portugal	0.1	0.1	0.1
Greece		0.1	0.1
Lithuania	0.0	0.1	0.1
Slovakia	0.0	0.0	0.1
Bulgaria	0.0		0.0
Croatia	0.0		0.0
Latvia	0.0		0.0
Slovenia	0.0		0.0
Estonia	0.0		0.0
Malta		0.0	0.0
SUM	23.7	15.4	39.2

Table 5 compares the aggregate coverage for EU treaties for investments in open reserves of cobalt (C_{EU}) with the coverage provided by Chinese (C_{CH}) and US (C_{US}) treaties. The table shows that the coverage for EU investors is significantly smaller compared to what investors from China or the US would have. This largely reflects the treaties that China and the US have with Congo (Dem.), where a large part of the open reserves are located. EU member state treaties with Congo (Dem.) add less than 29 percent to the EU coverage for cobalt. Also, China has a treaty with Australia, which additionally is protective, in contrast to five non-protective EU member state agreements that only add a few percentage points of protection.

gal (2011).

Table 5: EU, China and US treaty coverage for cobalt

	C_{EU}		C_{CH}		C_{US}	
Reserve country	**Non-prot.**	**Prot.**	**Non-prot.**	**Prot.**	**Non-prot.**	**Prot.**
Congo (Dem.)	18.1	10.5	63.6		63.6	
Australia		1.6		18.0		
Cuba	2.9	1.2		5.3		
Indonesia	0.3	0.4				
Philippines	1.0	1.3	2.8			
Canada	0.2		2.4			
Madagascar	0.3	0.3	1.1			
Turkiye	0.7	0.2	1.0		1.0	
Papua New Guinea	0.1			0.5		
SUM	23.7	15.4	70.8	23.8	64.6	

4.2 Lithium

The distribution of the world's reserves of lithium is given in Table 6. Three-quarters of these reserves are open. Both of the EU's strategic competitors have reserves, China more so than the US. 10 percent of world reserves are located in Other countries, and thus not included among the open reserves. The table also shows that the open reserves are highly concentrated, with three countries—Chile, Australia and Argentina—jointly holding 92 percent of these reserves.

Table 6: Distribution of lithium reserves

World reserves:		**Open reserves:**	
Open reserves	0.74	Chile	0.45
China	0.11	Australia	0.30
Other countries	0.10	Argentina	0.17
United States	0.04	Canada	0.04
Portugal	0.00	Brazil	0.02
		Zimbabwe	0.01

The coverage for EU investments in lithium is displayed in Table 7, and in Table A.3 in the Appendix.[35] The aggregate coverage is close to 59 percent. Most of this comes from three treaties, all with the single most import reserve country, Chile. France and Italy each have a non-protective agreements with Chile, and Germany has a protective agreement.

The second-most important reserve country is Australia. But as shown above, there are only treaties with five economically rather small East European countries, so their treaties add less than three percentage points to the coverage, despite the large reserves in Australia.

In contrast, EU member states have good treaty coverage with regard to the third largest reserve country, Argentina. There are a total of 18 treaties, which involve the 14 largest EU

[35]Hailes (2022) provides a detailed analysis of investment protection for lithium.

countries in terms of GDP (disregarding Ireland). But since Argentina only has just over 17 percent of the open reserves, the extensive EU treaty coverage still only adds 16 percentage points to the total coverage for the open reserves.

Table 7: EU member state treaty coverage for lithium (C_m)

	Non-protective	**Protective**	**SUM**
Germany	4.6	11.0	15.6
France	10.2		10.2
Italy	7.7		7.7
Spain		5.3	5.3
Poland	0.2	3.8	4.0
BLEU	1.8	0.7	2.5
Sweden		2.1	2.1
Czechia	0.1	1.7	1.7
Austria		1.7	1.7
Romania	0.1	1.6	1.7
Denmark	0.4	1.1	1.5
Netherlands		1.2	1.2
Finland		1.0	1.0
Portugal		0.9	0.9
Greece		0.6	0.6
Hungary	0.0	0.5	0.5
Croatia	0.0	0.3	0.3
Lithuania		0.2	0.2
Bulgaria		0.1	0.1
Slovakia	0.0		0.0
Latvia	0.0		0.0
SUM	25.2	33.7	58.9

Table 8 displays the aggregate treaty coverage for the EU, China and the US. Despite the quite high coverage from EU member state treaties, most of which comes from protective treaties, the most striking feature of Table 8 is the coverage for Chinese investments. These investments would have treaty protection in almost all of the open reserve countries. In addition, as shown in Table 6, Chinese investors would domestically have privileged access to roughly 10 percent of world reserves. EU investors are hence at a competitive disadvantage relative to Chinese investors in two respects. But they have an advantage relative to US investors, which would only have treaty protection for investments in around 17 percent of open reserves.

Table 8: EU, China and US treaty coverage for lithium

	C_{EU}		C_{CH}		C_{US}	
Reserve country	**Non-prot.**	**Prot.**	**Non-prot.**	**Prot.**	**Non-prot.**	**Prot.**
Chile	14.7	24.2	44.9			
Australia		2.7		29.9		
Argentina	9.7	6.6		17.4	17.4	
Canada	0.4		4.5			
Brazil						
Zimbabwe	0.4	0.1	1.5			
SUM	25.2	33.7	50.8	47.3	17.4	

4.3 Natural graphite

Table 9 highlights the distribution of world reserves of natural graphite. A striking feature are the large reserves in China. The open reserves account for only 60 percent of world reserves. However, U.S. Geological Survey (2024) only lists country-specific reserves that amount to 94 percent of the stated world reserves. There are hence some six percent of world reserves that are unaccounted for, that depending on location, should possibly be included among the open reserves.[36]

Table 9: Distribution of natural graphite reserves

World reserves:		**Open reserves:**	
Open reserves	0.60	Brazil	0.44
China	0.28	Mozambique	0.15
Russia	0.05	Madagascar	0.14
Korea, North	0.01	Tanzania	0.11
		India	0.05
		Turkiye	0.04
		Canada	0.03
		Mexico	0.02
		South Korea	0.01
		Sri Lanka	0.01
		Norway	0.00

The country with the by far largest open reserves is Brazil, which has 44 percent of the reserves. This is slightly more than what is located in the three countries that are next in terms of reserve size, Mozambique, Madagascar, and Tanzania. In addition to the open reserve countries thar are listed in the table, U.S. Geological Survey (2024) also mentions Austria, Germany, Ukraine and Vietnam, but without specifying how large their reserves are. However, since countries are currently producing very small volumes, it seems plausible that their reserves are also rather small.

[36]The 60 percent for open reserves is the share of the stated total world reserves.

Table 10 shows the contribution by EU member states to the EU aggregate treaty coverage for natural graphite. The total coverage is just below 30 percent, most of which comes through non-protective treaties. Part of the explanation for why this number is so low is the complete lack of treaties with Brazil. As shown in Table A.4 in the Appendix, several larger EU countries—France, Germany, and Italy—have treaties with Mozambique, and France and Germany also have treaties with Madagascar. These treaties jointly account for roughly half of the coverage. And the almost complete EU member state coverage with regard to Turkiye contributes about a quarter of the coverage.

Table 10: EU member state treaty coverage for natural graphite (C_m)

	Non-protective	**Protective**	**SUM**
Germany	8.1	3.5	11.6
France	5.9		5.9
Italy	2.8	1.3	4.1
Sweden	1.4	0.2	1.6
BLEU	1.4	0.0	1.4
Netherlands	1.3	0.1	1.4
Denmark	0.3	0.4	0.8
Spain	0.2	0.4	0.6
Finland	0.4	0.1	0.5
Poland	0.3	0.0	0.4
Portugal		0.3	0.3
Czechia	0.2	0.0	0.2
Austria	0.2		0.2
Romania	0.1	0.0	0.2
Greece		0.1	0.1
Hungary	0.0	0.1	0.1
Slovakia	0.0	0.0	0.1
Lithuania	0.0	0.0	0.0
Croatia	0.0		0.0
Bulgaria	0.0	0.0	0.0
Latvia	0.0	0.0	0.0
Slovenia	0.0		0.0
Estonia	0.0		0.0
Malta		0.0	0.0
SUM	22.9	6.7	29.6

Table 11 compares the aggregate EU coverage with coverage for Chinese and US investments. The 30 percent aggregate EU coverage is substantially less than the 50 percent coverage that Chinese investments would have. China has non-protective treaties with all open reserve countries, except for Brazil, India and South Korea. But the latter two countries only have small open reserves, so the lack of treaties with these countries does not matter much. Since Chinese investors also have privileged access to 28 percent of world reserves domestically, the EU is clearly at a significant competitive disadvantage relative to China. The only bright spot from an EU perspective is that it has broader treaty protection than the US.

Table 11: EU, China and US treaty coverage for natural graphite

	C_{EU}		C_{CH}		C_{US}	
Reserve country	**Non-prot.**	**Prot.**	**Non-prot.**	**Prot.**	**Non-prot.**	**Prot.**
Brazil						
Mozambique	10.5	0.2	14.8		14.8	
Madagascar	3.4	3.5	14.2			
Tanzania	3.1	1.6	10.6			
India	0.0					
Turkiye	3.1	0.8	4.1		4.1	
Canada	0.3		3.4			
Mexico	1.5	0.1	1.8			
South Korea	0.4	0.3		1.1		
Sri Lanka	0.5	0.1	0.9		0.9	
Norway	0.0	0.0	0.4			
SUM	22.9	6.7	50.1	1.1	19.7	

4.4 Manganese

The distribution of the reserves of manganese is given in Table 12. Around 86 percent of the world reserves are open, and most of the rest is located in China.[37] The table also shows that the open reserves are geographically concentrated, with two-thirds located in South Africa and Australia, and with Brazil having another 17 percent.

Table 12: Distribution of manganese reserves

World reserves:		**Open reserves:**	
Open reserves	0.86	South Africa	0.37
China	0.15	Australia	0.31
		Brazil	0.17
		Ukraine	0.09
		Gabon	0.04
		India	0.02
		Ghana	0.01
		Kazakhstan	0.00
		Mexico	0.00

The aggregate coverage for the EU is unusual in that virtually all EU member state have at least one treaty with an open reserve country, as can be seen from Table 13 and from Table A.5 in the Appendix. Nevertheless, the total coverage is extremely low. This is partly due to the fact that the two countries with which there are most treaties—Kazakhstan and Mexico—hardly have any reserves. Also, there are very few treaties with the countries that have larger

[37] U.S. Geological Survey (2024) reports that the reserves in "Other countries" are small". It also list production data for 2023 for Burma, Cote d'Ivoire, Georgia, Malaysia, and Vietnam, all of which rather small volumes, but no data on their reserves.

reserves. There are only three bilateral treaties with South Africa, all of which with smaller EU countries partners (Czechia, Finland, and Sweden), and only five treaties with Australia, all of which involving East European countries, and no treaty with Brazil. The main positive aspect is that there are many treaties with Ukraine.

Table 13: EU member state treaty coverage for manganese (C_m)

	Non-protective	**Protective**	**SUM**
Germany	1.0	2.4	3.4
Poland	0.4	1.3	1.6
Sweden	0.3	1.3	1.6
France	1.5		1.5
Czechia	0.2	1.2	1.4
Spain	0.3	0.8	1.1
Finland	0.2	0.6	0.8
Netherlands	0.0	0.6	0.6
Romania	0.1	0.5	0.6
BLEU	0.4	0.1	0.5
Italy	0.5		0.5
Hungary		0.4	0.4
Austria	0.0	0.2	0.3
Denmark		0.2	0.2
Portugal		0.2	0.2
Lithuania	0.0	0.2	0.2
Greece	0.1	0.0	0.1
Slovakia	0.1		0.1
Bulgaria	0.0		0.0
Croatia	0.0		0.0
Slovenia	0.0		0.0
Estonia	0.0	0.0	0.0
Latvia	0.0		0.0
SUM	5.1	10.0	15.1

Turning to a comparison with China and the US, Table 14 shows that the very limited EU coverage actually exceeds that for the US. But it dwindles in comparison to the 80 percent coverage for Chinese investments. China has protective treaties with both Australia and South Africa, and a non-protective treaty with Ukraine.

Table 14: EU, China and US treaty coverage for manganese

	C_{EU}		C_{CH}		C_{US}	
Reserve country	**Non-prot.**	**Prot.**	**Non-prot.**	**Prot.**	**Non-prot.**	**Prot.**
South Africa		2.5		36.9		
Australia		2.8		30.7		
Brazil						
Ukraine	3.0	4.1	8.6		8.6	
Gabon	1.8	0.2	3.7			
India	0.0					
Ghana		0.3	0.8			
Kazakhstan	0.1	0.1	0.3		0.3	
Mexico	0.3	0.0	0.3			
SUM	5.1	10.0	13.8	67.6	8.9	

4.5 Nickel

The final mineral to be considered is nickel. Most of the world reserves are open, as can be seen from Table 15. China, Russia and the US hold some reserves, but jointly less than 10 percent. The open reserves are again dominated by three countries, which jointly hold around 87 percent. Indonesia accounts for half of the open reserves, Australia just over 20 percent, and Brazil 15 percent.

Table 15: Distribution of nickel reserves

World reserves:		**Open reserves:**	
Open reserves	0.84	Indonesia	0.50
Other countries	0.07	Australia	0.22
China	0.03	Brazil	0.15
Russia	0.06	New Caledonia	0.07
United States	0.00	Philippines	0.04
		Canada	0.02

Table 16 shows that the aggregate EU treaty coverage for nickel is 13 percent, which is the lowest among the five minerals we have examined. The larger EU members states are noticeably poorly represented. For instance, Germany and France only have one treaty each, in both cases with the Philippines, as can be seen from Table A.6. There are only five EU members states that have treaties with Indonesia—Czechia, Denmark, Finland, Poland, and Sweden—and there only five treaties with Australia, all of which with East European countries. All these EU countries are small in terms of GDP. As a consequence, the total coverage is very low.

Table 16: EU member state treaty coverage for nickel (C_m)

	Non-protective	Protective	SUM
Poland	2.1	0.9	3.1
Sweden		1.7	1.7
Czechia	0.1	1.3	1.4
Denmark	1.2	0.1	1.3
Germany		1.1	1.1
Finland		0.9	0.9
France	0.7		0.7
Italy	0.5		0.5
Romania	0.1	0.4	0.5
Spain		0.4	0.4
Netherlands		0.3	0.3
Hungary	0.0	0.2	0.3
BLEU		0.2	0.2
Austria	0.1		0.1
Lithuania		0.1	0.1
Portugal		0.1	0.1
Slovakia	0.0		0.0
Croatia	0.0		0.0
Latvia	0.0		0.0
SUM	5.0	7.6	12.6

The treaty coverage for nickel is limited also for EU's two strategic competitors, as shown in Table 17. The main reason is that Indonesia has relatively few treaties in general, and none with either China or the US. For China the total coverage is just over 28 percent, which is low relative to Chinese coverage for the other minerals we have examined. The US does not have a treaty with any of the open reserve countries.

Table 17: EU, China and US treaty coverage for nickel

	C_{EU}		C_{CH}		C_{US}	
Reserve country	**Non-prot.**	**Prot.**	**Non-prot.**	**Prot.**	**Non-prot.**	**Prot.**
Indonesia	3.3	3.5				
Australia		2.0		22.0		
Brazil						
New Caledonia						
Philippines	1.5	2.1	4.4			
Canada	0.2		2.0			
SUM	5.0	7.6	6.4	22.0		

5 Policy implications

We will now draw some broader conclusions regarding the EU member state investment treaty regime, as it applies to investments in minerals that are critical to electric vehicles

production.

5.1 The aggregate EU coverage is limited

Table 18 compares the total coverages for the three strategic competitors, for each of the minerals. The coverage for the EU is rather mixed. There will be very weak protection for EU investments in reserves of manganese and nickel, and slightly better for natural graphite and cobalt. The most complete coverage would be for investments in reserves of lithium, where additionally the coverage mainly stems from protective treaties. Hence, the treaty coverage for EU investments in open reserves of the five critical minerals ranges from almost non-existent to medium strong.

Table 18: Total coverage

Mineral	C_{EU}	C_{CH}	C_{US}
Cobalt	39	95	65
Lithium	59	98	17
Natural graphite	30	51	20
Manganese	15	73	9
Nickel	13	28	0

The EU treaty regime pales in comparison to the Chinese treaties, however:

Conclusion 1: *The treaty protection for Chinese investments in the open reserves of the five critical minerals completely dominates the protection for EU and US investments:*
- China has wider, or vastly wider, total coverage for all five minerals.
- China has broader coverage through protective treaties for four of the minerals.

Additionally, not only does China have broader treaty coverage for its foreign investment, China also has much larger domestic reserves of lithium, manganese and natural graphite.

5.2 The reason for the limited coverage varies

The mixed performance by the EU treaty regime can be caused by several factors. One possible feature might be a lack of treaties with the major open reserve countries. This aspect is illustrated in Figure 1 by a lack of a treaty with reserve country B. Another potential problem is a lack of treaties between the larger EU countries and open reserve countries, which in Figure 1 would tend to reduce the height of the staples for the two reserve countries with which there are treaties. The problem will be compounded if the largest EU countries lack treaties with the largest open reserve countries.

A striking feature of the data is that it is skewed in two respects. First, there is a considerable concentration of EU GDP, with the two largest countries accounting for 41 percent, and the three largest for more half of the EU GDP. Second, the open reserves are concentrated to a

few countries. The top three countries account for over 85 percent of the open reserves for all minerals, except for natural graphite for which the figure is 73 percent. Two open reserve countries stand out as particularly important for the five minerals: Australia is among the three countries with the largest open reserve for four of the minerals, and Brazil is among the top three countries for three of the minerals. All other open reserve countries on the top three lists appear only for one mineral. Since only five smaller EU countries have treaties with Australia, and no country has a treaty with Brazil, the EU position tends to be weak in general.

But there are still significant difference across the minerals. Both France and Germany have treaties with the country with the largest reserves (Congo (Dem.)), and like Italy have treaties with both the largest (Chile) and the third largest (Argentina) open reserve country for lithium. There is a similar picture with regard to natural graphite. However, neither of the three largest EU countries has any treaty with the three largest open reserve countries for manganese or nickel.

The mixed picture is also illustrated in Table 19, which gives the correlation between EU countries' shares of EU GDP, and the shares of the open reserves that the treaties cover, for the treaties that EU member states have with the latter countries. It shows that there is a certain positive correlation for cobalt and natural graphite, indicating that larger EU countries tend to have treaties with larger open reserve countries. However, for manganese and nickel the correlations are even negative.

Table 19: Corr(g_e, s_r) for EU member state treaties with open reserve countries

Cobalt	.21
Lithium	0.06
Natural graphite	0.22
Manganese	-0.19
Nickel	-0.17

It thus seems hard to draw any more general conclusions regarding the performance of the EU treaty regime:

Conclusion 2: *The reason for the limited coverage of the EU treaty regime varies by mineral. But a general drawback is the lack of treaties with Australia and Brazil.*

5.3 The one treaty that the EU should negotiate

A striking weakness of the EU treaty regime is its fragmentation. For instance, there are some 70 treaties with open reserve countries for cobalt. However, this has to be set against the number that would be required to give protection to all EU investors in all nine reserve

countries, which is 27 x 9 = 243. It will hence require a very large number of investment treaties for the EU to get a complete coverage. The same phenomenon arises for all the other minerals. This observation points to a feature that is trivial in a sense, but still could be important when looking ahead: it would require significantly less negotiation efforts if the EU were to form treaties with the major open reserve countries than if all member states were to do this.

With which open reserve country should then the EU primarily seek to form a treaty? The findings above points to the lack of treaties with Australia and Brazil as the main reasons for the limited EU coverage. However, it seems unlikely that Brazil would currently be willing to form investment treaties, and in particular treaties that given considerable investment protection, given its general skepticism regarding investment treaties. The main target for treaty formation should presumably instead be Australia. As seen above, Australia is richly endowed, with 18 percent of the open reserves of cobalt, 30 percent for lithium, 31 percent for manganese, and 22 percent for nickel. Another reason for negotiating an agreement with Australia is that China already has a protective treaty. EU investors are hence currently at a competitive disadvantage relative to Chinese investors with regard to investment in Australia.

The fact that Australia has 15 bilateral treaties in force, and that Australia signed an agreement with United Arab Emirate as recently as in November 2024, suggest that Australia might be open to negotiating a treaty with the EU. However, there is skepticism also in Australia regarding investment treaties. A number of Australian treaties were terminated in the late 1990s, and the 15 treaties Australia has in force constitutes a rather small number for a developed country. There is also a large local mining industry that might be opposed to treaties that aim to increase foreign ownership of local mineral reserves.

Conclusion 3: *Apart from an agreement with Brazil, the one agreement that would do the most to enhance protection for EU investments in the open reserves, is one between the EU and Australia. But even with this agreement, Chinese investments would have more treaty coverage, except for in the case of nickel.*

5.4 A changing landscape

The analysis above has focused on the open reserves in 2024. But a central feature of the problem facing the EU is that the geoeconomic landscape is rapidly evolving, for several reasons. Some aspects, such as changes in the policies of strategic competitors, or changes in demand due to technological advancements, fall outside the scope of this study. But there are two dynamic aspects that we will briefly mention.

The first is the possible depletion of the reserves. To get some feeling for the how rapidly this might occur, the middle column in Table 20 gives the relationship between the open reserves for the minerals in 2024 and world production in 2023, as reported by U.S. Geological Survey (2024). The ratios vary dramatically. This suggests that it is much more urgent for the EU

to address the lack of treaties that cover open reserves of cobalt and nickel, than for the other three minerals.

Table 20: Reserves over time and relative to production

	Open reserves 2024 rel. to prod. 2023	**World reserves 2024 rel. to 2015**
Cobalt	41	1.5
Lithium	137	2.1
Natural graphite	512	2.5
Manganese	90	3.3
Nickel	38	1.6

A second important aspect is that reserves tend to increase over time. To illustrate, the last column in Table 20 gives the ratio between the 2024 and 2015 world reserves, as reported by U.S. Geological Survey (2024) and U.S. Geological Survey (2015), respectively. It shows that the reserves of all five minerals have increased significantly during these 10 years. It seems plausible that the trend to identify new reserves will continue, given the interest in critical raw materials. If new reserves are identified in countries that did not appear high up on the lists of open reserve countries above, it might become attractive for the EU or EU member states to form treaties with these new countries.

Conclusion 4: *When identifying the investment treaties that would be most desirable to form, account should be taken of differences in the relative rates of depletion of the reserves of the minerals, and if possible, also of the likelihood of increases in the reserves.*

5.5 EU treaties as means to achieve geoeconomic objectives

Finally, a starting point of this paper was the notion that EU member state investment treaties, which have been severely criticized, might serve a *geoeconomic* role that has not been considered in the debate. However, our findings lend at best weak support for this notion, in particular when these treaties are compared with the Chinese treaties. The analysis has been confined to only five of the close to 40 raw materials that the EU identifies as critical, so it is too early to make definitive call on the geoeconomic value of the treaty regime for the EU. However, the first indications are not very promising.

Conclusion 5: *Our findings do not lend any stronger support for the notion that the EU member state treaties can serve a geopolitical objective for the EU by protecting investments in the critical raw materials.*

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A Appendix

Table A.1: Treaties that have not been mapped in the UNCTAD-led project and that involve open reserve countries for one or several of the minerals

Bulgaria - Cuba	Greece - Ukraine
Bulgaria - Ukraine	Hong Kong - Mexico
China - Canada	Italy - Gabon
China - Congo (Dem.)	Latvia - Kazakhstan
China - Kazakhstan	Latvia - Ukraine
China - Mozambique	Poland - Indonesia
China - Tanzania	Poland - Kazakhstan
China - Türkiye	Poland - Ukraine
China - Ukraine	Romania - Gabon
Denmark - Indonesia	Slovakia - Kazakhstan
Denmark - Mozambique	Slovakia - Ukraine
Denmark - Zimbabwe	Slovenia - Ukraine
Estonia - Kazakhstan	Sweden - Mozambique
Finland - Kazakhstan	

Table A.2: EU treaty coverage for cobalt

	Australia	Canada	Congo (Dem.)	Cuba	Indonesia	Madagascar	Papua N. G.	Philippines	Turkiye	**SUM**
Non-protective:										
Austria								0.1	0.0	0.1
BLEU			2.5			0.0			0.0	2.6
Bulgaria				0.0					0.0	0.0
Croatia		0.0							0.0	0.0
Czechia		0.0						0.0	0.0	0.1
Denmark					0.1					0.1
Estonia									0.0	0.0
France				0.9		0.2		0.5	0.2	1.7
Germany			15.6	1.3			0.1		0.2	17.2
Hungary		0.0								0.0
Italy				0.7				0.3	0.1	1.1
Latvia		0.0							0.0	0.0
Lithuania									0.0	0.0
Netherlands									0.1	0.1
Poland		0.1			0.2				0.0	0.4
Portugal				0.1						0.1
Romania		0.0						0.0	0.0	0.1
Slovakia		0.0								0.0
Slovenia									0.0	0.0
Sweden						0.0				0.0
SUM		0.2	18.1	2.9	0.3	0.3	0.1	1.0	0.7	23.7
Protective:										
Austria				0.1						0.1
BLEU								0.1		0.1
Czechia	0.3				0.1					0.4
Denmark								0.1	0.0	0.1
Finland					0.1			0.0	0.0	0.1
France			10.5							10.5
Germany						0.3		0.7		0.9
Greece				0.1					0.0	0.1
Hungary	0.2			0.1					0.0	0.3
Lithuania	0.1									0.1
Malta									0.0	0.0
Netherlands				0.3				0.2		0.5
Poland	0.7									0.7
Portugal								0.0	0.0	0.1
Romania	0.3			0.1						0.4
Slovakia				0.0					0.0	0.0
Spain				0.5				0.2	0.1	0.8
Sweden					0.2				0.0	0.2
SUM	1.6		10.5	1.2	0.4	0.3		1.3	0.2	15.4
TOTAL	1.6	0.2	28.6	4.1	0.7	0.5	0.1	2.3	0.9	39.2

Table A.3: EU treaty coverage for lithium

	Argentina	Australia	Canada	Chile	Zimbabwe	**SUM**
Non-protective						
BLEU				1.8		1.8
Croatia			0.0			0.0
Czechia			0.1			0.1
Denmark	0.4				0.0	0.4
France	2.9			7.4		10.2
Germany	4.3				0.4	4.6
Hungary			0.0			0.0
Italy	2.1			5.6		7.7
Latvia			0.0			0.0
Poland			0.2			0.2
Romania			0.1			0.1
Slovakia			0.0			0.0
SUM	9.7		0.4	14.7	0.4	25.2
Protective						
Austria	0.5			1.2		1.7
BLEU	0.7					0.7
Bulgaria	0.1					0.1
Croatia	0.1			0.2		0.3
Czechia	0.3	0.5		0.8	0.0	1.7
Denmark				1.1		1.1
Finland	0.3			0.7		1.0
Germany				11.0		11.0
Greece				0.6		0.6
Hungary	0.2	0.3				0.5
Lithuania	0.1	0.1				0.2
Netherlands	1.1				0.1	1.2
Poland	0.7	1.2		1.8		3.8
Portugal	0.3			0.7		0.9
Romania	0.3	0.5		0.8		1.6
Spain	1.5			3.8		5.3
Sweden	0.6			1.5		2.1
SUM	6.6	2.7		24.2	0.1	33.7
TOTAL	16.3	2.7	0.4	39.0	0.5	58.9

Table A.4: EU treaty coverage for natural graphite

	Canada	India	Madagascar	Mexico	Mozambique	Norway	South Korea	Sri Lanka	Tanzania	Turkiye	**SUM**
Non-protective											
Austria				0.1						0.1	0.2
BLEU			0.6	0.1	0.6					0.2	1.4
Bulgaria										0.0	0.0
Croatia	0.0						0.0			0.0	0.0
Czechia	0.1			0.0			0.0	0.0		0.1	0.2
Denmark					0.3						0.3
Estonia										0.0	0.0
Finland				0.0	0.2				0.2		0.4
France			2.3	0.3	2.4			0.1		0.7	5.9
Germany				0.4	3.6		0.3	0.2	2.6	1.0	8.1
Hungary	0.0										0.0
Italy				0.2	1.8		0.1	0.1		0.5	2.8
Latvia	0.0									0.0	0.0
Lithuania		0.0								0.0	0.0
Netherlands				0.1	0.9					0.3	1.3
Poland	0.1					0.0				0.2	0.3
Romania	0.1							0.0		0.1	0.1
Slovakia	0.0			0.0							0.0
Slovenia										0.0	0.0
Spain				0.2							0.2
Sweden			0.5	0.1	0.5			0.0	0.4		1.4
SUM	0.3	0.0	3.4	1.5	10.5	0.0	0.4	0.5	3.1	3.1	22.9
Protective											
BLEU								0.0			0.0
Bulgaria							0.0				0.0
Czechia						0.0					0.0
Denmark				0.0				0.0	0.3	0.1	0.4
Finland							0.0	0.0		0.1	0.1
Germany			3.5								3.5
Greece				0.0			0.0			0.1	0.1
Hungary							0.0			0.0	0.1
Italy									1.3		1.3
Latvia							0.0				0.0
Lithuania							0.0				0.0
Malta										0.0	0.0
Netherlands							0.1	0.1			0.1
Poland							0.0				0.0
Portugal				0.0	0.2		0.0			0.1	0.3
Romania							0.0				0.0
Slovakia						0.0	0.0			0.0	0.0
Spain							0.1			0.3	0.4
Sweden							0.0			0.1	0.2
SUM			3.5	0.1	0.2	0.0	0.3	0.1	1.6	0.8	6.7
TOTAL	0.3	0.0	6.9	1.6	10.7	0.0	0.7	0.7	4.7	3.9	29.6

Table A.5: EU treaty coverage for manganese

	Australia	Gabon	Ghana	India	Kazakhstan	Mexico	South Africa	Ukraine	SUM
Non-protective									
Austria					0.0	0.0			0.0
BLEU					0.0	0.0		0.3	0.4
Bulgaria					0.0			0.0	0.0
Croatia								0.0	0.0
Czechia					0.0	0.0		0.2	0.2
Estonia					0.0				0.0
Finland					0.0	0.0		0.1	0.2
France					0.1	0.1		1.4	1.5
Germany		0.9				0.1			1.0
Greece								0.1	0.1
Italy		0.5				0.0			0.5
Latvia					0.0			0.0	0.0
Lithuania				0.0					0.0
Netherlands						0.0			0.0
Poland					0.0			0.4	0.4
Romania		0.1			0.0				0.1
Slovakia					0.0	0.0		0.1	0.1
Slovenia								0.0	0.0
Spain		0.3				0.0			0.3
Sweden						0.0		0.3	0.3
SUM		1.8		0.0	0.1	0.3		3.0	5.1
Protective									
Austria								0.2	0.2
BLEU		0.1							0.1
Czechia	0.5						0.7		1.2
Denmark			0.0			0.0		0.2	0.2
Estonia								0.0	0.0
Finland							0.6		0.6
Germany			0.2		0.1			2.1	2.4
Greece						0.0			0.0
Hungary	0.3				0.0			0.1	0.4
Lithuania	0.1				0.0			0.0	0.2
Netherlands			0.0		0.0			0.5	0.6
Poland	1.3								1.3
Portugal		0.1				0.0		0.1	0.2
Romania	0.5								0.5
Spain					0.0			0.7	0.8
Sweden					0.0		1.3		1.3
SUM	2.8	0.2	0.3		0.1	0.0	2.5	4.1	10.0
TOTAL	2.8	2.0	0.3	0.0	0.2	0.3	2.5	7.1	15.1

Table A.6: EU treaty coverage for nickel

	Australia	Canada	Indonesia	Philippines	**SUM**
Non-protective					
Austria				0.1	0.1
Croatia		0.0			0.0
Czechia		0.0		0.1	0.1
Denmark			1.2		1.2
France				0.7	0.7
Hungary		0.0			0.0
Italy				0.5	0.5
Latvia		0.0			0.0
Poland		0.1	2.1		2.1
Romania		0.0		0.1	0.1
Slovakia		0.0			0.0
SUM		0.2	3.3	1.5	5.0
Protective					
BLEU				0.2	0.2
Czechia	0.4		0.9		1.3
Denmark				0.1	0.1
Finland			0.8	0.1	0.9
Germany				1.1	1.1
Hungary	0.2				0.2
Lithuania	0.1				0.1
Netherlands				0.3	0.3
Poland	0.9				0.9
Portugal				0.1	0.1
Romania	0.4				0.4
Spain				0.4	0.4
Sweden			1.7		1.7
SUM	2.0		3.5	2.1	7.6
TOTAL	2.0	0.2	6.7	3.7	12.6