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Investment Treaties and the Threat to Biodiversity

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Abstract

Protecting biodiversity will require the phase-out of harmful production at a large scale. However, some of these stranded investments will be foreign-owned, and can therefore be protected by the more than 2 600 investment treaties that are in force worldwide. The compensation requirements that these treaties impose are often alleged to dissuade host countries from undertaking desirable policy measures that harm foreign investor interests. This paper seeks to identify the countries, and the bilateral investment treaties they are parties to, that pose the most severe threat to biodiversity protection. It assumes that these treaties combine three features: (i) they can be interpreted to impose far-reaching protection of (ii) considerable foreign investment positions, (iii) in countries with vulnerable biodiversity. To operationalize these notions, the paper identifies 15 criteria that a treaty must fulfil to be considered problematic from a host country regulatory perspective. It also introduces an index for biodiversity vulnerability, based on Red List data. The analysis of 1 781 bilateral investment treaties and the 172 countries that are parties to these treaties identifies 12 countries that are the most concern from a biodiversity perspective. These countries are almost all newly industrialized and middle-income. The paper also identifies 44 agreements that from a biodiversity perspective should be prioritized targets for renegotiation or termination.

Keywords: Biodiversity, international investment agreements, investment treaties, stranded assets, regulatory chill

JEL Codes: Q57, F21, F23, F53, K33

1 Introduction

The need to prevent biodiversity degradation has been recognized for decades. The UN Convention on Biological Diversity entered into force already in 1993, and stated that the conservation of biodiversity is "a common concern of humankind." The convention was supported by the Cartagena Protocol in 2003, and by the Nagoya Protocol in 2014. The most recent Conference of the Parties, COP15, ended in 2022 with adoption of the Kunming-Montreal Global Biodiversity Framework. Among other undertakings, it sets ambitious targets to place 30 per cent of the planet and 30 per cent of degraded ecosystems under protection by 2030. Such measures are much needed, with current assessments reporting alarming levels of global biodiversity deterioration.

The implementation of these ambitious targets will require large-scale phase-out of production that is harmful to biodiversity. Some of these assets will be foreign owned and can therefore be protected by *international investments agreements*. More than 2 600 such state-to-state treaties protect investments between parties against a wide range of host country policy measures. These treaties have been severely criticized for a wide range of features.[1] A general claim is that the compensation requirements that the agreements often impose can cause *regulatory chill*, that is, induce host countries to abstain from undertaking desirable policy measures that harm foreign investment. This critique has recently focused on the alleged chilling effects on climate policies.[2] In fact, several European countries have declared their withdrawal from one of the main investment agreements, the Energy Charter Treaty, on the grounds that it is incompatible with the Paris Agreement on climate.

There is an emerging concern that investment treaties might have a similar chilling effect on policy measures to *prevent biodiversity loss*.[3] Given the nature of the climate and biodiversity problems, and the perceived severity of the threat that these treaties pose to climate policy, it would be highly desirable to evaluate the risk that the agreements pose to biodiversity protection. However, the discussion regarding the adverse climate effects have largely focused on a single agreement, the Energy Charter Treaty.[4] But the

[1] See e.g. Boyd (2023) for a highly critical discussion of the environmental impacts of investment treaties.

[2] See Anzizu and Reisch (2024) for a recent analysis.

[3] See e.g. the comprehensive analysis and literature references by Rarrick (2019), or the statement about environmental impact of investment treaties by several non-governmental organizations in International Institute for Sustainable Development (2023).

[4] See e.g. Bernasconi-Osterwalder and Brauch (2019) for references to the huge policy literature on the impact of investment agreements on the climate. Ipp et al. (2022) comprehensively review the Energy Charter Treaty case law from a climate perspective.

threat to biodiversity protection is distinct in some key aspects. One is that the threat can stem from any or all of the thousands of investment agreements in force. Second is that biodiversity policies can target a wide range of harmful activities. It would therefore be an overwhelming task to evaluate for each treaty all measures that might be taken to protect biodiversity, how they might give rise to disputes between investors and host countries, and to assess the probabilities that compensation claims under different treaties would be successful. We must consequently take some other route if we want to assess the threat to biodiversity from the investment treaty regime. In what follows we will approach the issue differently in two respect.

This study We will assume that the most threatening treaties *share three features* that can identified without undertaking the above-mentioned extremely laborious examinations of all potential compensation requests, etc. We will also limit the aim to finding the treaties that are of *most* concern from a biodiversity perspective. The study will thus *rank* the severity of the threats posed by agreements, but will not assess absolute threat levels.

The first feature concerns treaty design. While most investment treaties share very similar general designs, they still vary in important respects. To identify treaties that can most readily be interpreted to impose stringent compensation requirements on host countries that phase out investments that are harmful to biodiversity, the study will draw on the mapping of the core features of 1 781 in force, bilateral investment agreements in a project that has been coordinated by UNCTAD. Of particular concern are agreements that combine vaguely formulated substantive provisions with a lack of exception clauses for environmental measures, and that allow private foreign investors to pursue disputes against host countries (Investor-State Dispute Settlement, ISDS). Treaties with these features will be denoted "inflexible," since compensation requirements are not adjusted to the regulatory needs of the host countries, or have at least been interpreted this way by arbitration panels.

Second, a necessary condition for inflexible treaties to pose a threat to biodiversity is that they protect *significant foreign investment positions*. Moreover, investor compensation is likely increasing in the investment positions covered, which would induce host countries from abstaining from policies to protect biodiversity. To capture this aspect, the study will draw on OECD statistics on bilateral FDI positions (stocks) for agreements involving at least one OECD country partner.

Third, inflexible agreements that protect significant foreign FDI positions are likely

to be most problematic in host countries with *vulnerable biodiversity*. To capture vulnerability at the country level, we will draw on data that is used to derive the well-known Red List ranking of threatened species. We will define a similar index to the Red List Index that will be interpreted as capturing the expected (in a statistical sense) number of species extinctions for each country.

Based on the three aspects briefly described above we will thus seek to identify agreements that simultaneously:

- have highly "investor-friendly" drafting,
- and protect significant investment positions,
- in countries with threatened biodiversity.

These will be denoted as the "most problematic" agreements, and the countries that are particularly exposed as the "most threatened" countries; both concepts will be given more exact definitions below. While this is a more modest task than delving into specific policies and treaties, it will still require operationalizing the criteria above, and applying them to rather large data sets.

Findings A first finding is that when applying the criteria for an agreement to be inflexible to the 1 781 agreements in our data set, no less than 995 of these treaties are classified as inflexible. Investor-friendly drafting is thus highly pervasive. Furthermore, the majority of countries are parties to at least one inflexible agreement. Of the 172 country parties to the 1 781 treaties we observe, no less than 157 countries are parties to at least one inflexible treaty.

Second, we identify 12, mostly middle-income, countries that stand out in terms of their biodiversity threat levels, and the magnitude of their inward FDI positions that are covered by inflexible agreements. These countries are furthermore parties to many inflexible as well as non-inflexible agreements, have limited government resources relative to the investment positions that are protected by inflexible agreements, and are rich in biodiversity.

Richer countries do not make it into the list of the 12 most threatened countries, largely because their biodiversity is less threatened according to our indicator. Nor do any of the poorest countries appear on this list, despite sometimes having vulnerable biodiversity, mainly since they do not have sufficiently large inward investment positions.

We also identify the 44 most "problematic agreements" that pose the greatest potential threat to biodiversity protection efforts. These agreements mainly involve the 12 most threatened host countries.[5] We find that European countries and South Korea heavily dominate as source countries to the 44 problematic agreements.

Several policy conclusions follow from the analysis. The first is that the 44 most problematic agreements should be redrafted or terminated. This would affect relatively little investment, and involve less than three percent of the 1 781 agreements in our data set. At the same time it could remove USD 572 billion in FDI positions from the protection provided by inflexible agreements, which is a few percent of total global FDI positions.

Second, there is a tension, or at least a lack of coherence, between the stated ambitions regarding biodiversity protection the EU Commission's, and some Member States, and the actual policies of European countries. Hardly any European country have taken the initiative to address its problematic agreements, despite the fact that this would only affect a very small proportion of the total outward FDI positions.

Structure of the paper Section 2 introduces the data on investment treaties that will be drawn on throughout the study. It also specifies the 15 criteria that identify agreements with drafting that have enabled arbitration panels to interpret the agreements as imposing far-reaching compensation obligations on host countries. Section 3 discusses issues related to investment data. Section 4 introduces our measure of biodiversity vulnerability. Section 5 brings the indicators together, to identify the threatened countries and the problematic agreements. Section 6 concludes. Appendix A provides a brief primer on salient features of investment treaties and their discontent, for the reader who is unfamiliar with these agreements. Appendix B points to some of the problems we see with the standard national Red List indicator for the purposes of this study.

[5]There is not complete overlap since the criterion for most threatened country is based on the aggregate inward FDI positions under all inflexible agreements to which the host country is party to, whereas the classification as most problematic agreements is based on the investment levels that are protected by the respective agreements.

2 Identifying agreements with inflexible drafting

Investment treaties can affect the incentives for host countries to phase out production that is harmful to biodiversity in a variety of ways.[6] But we will assume that the investment agreements that pose the main *potential threat to biodiversity* are characterized by three broad features:

- Vaguely drafted substantive obligations.
- No restrictions on these substantive obligations through carve-outs are similar for regulatory policy measures.
- Unconstrained ISDS mechanisms.

The vagueness of substantive provisions, combined with the lack of carve-outs, make it possible for arbitration panels to interpret the agreement as imposing far-reaching compensation obligations on the host country.[7] Such interpretations will be more likely enforced if investors can freely use ISDS mechanisms. Note that all three features are necessary for there to be a reason for concern.[8] This study assumes that investments that existed at the time of the introduction of these international agreements will not be protected, since we interpret this to be the dominant view regarding how arbitration panels will most likely reasons. We also note that the introduction to the Kunming-Montreal Global Biodiversity Framework from 2023 states (with added emphasis):[9]

> The Framework needs to be implemented in accordance with relevant international obligations. Nothing in this Framework should be interpreted as agreement to modify the rights and obligations of a Party under the Convention or *any other international agreement*;...

Traditional investment treaties, which have been entered into before the above-mentioned convention, do not include any corresponding statements regarding their roles in the "pecking order" among international agreements.

[6] For economic analyses of possible impacts, see e.g. Horn (2024) and Horn and Sanctuary (2024). See Horn and Tangerås (2021) for references to the meagre economic theory literature on investment treaties.

[7] See Dolzer et al. (2022) for an overview of international investment law.

[8] There is an ongoing legal discussion regarding whether international climate and biodiversity conventions can protect host countries from compensation claims by investors.

[9] Obtained from www.cbd.int/gbf/introduction.

The less obvious step is to identify the actual investment agreements that have these broadly described features. However, it is relatively straightforward to determine whether an agreement includes carve-outs, or ISDS without restrictions, although there will be provisions that fall into a grey zone in this regard.

What is more problematic however, is to identity the relevant substantive provisions. All substantive provisions are by necessity vague to some degree. So which are the provisions that are likely to restrain host country protection of biodiversity the most? It is very hard to obtain systematic information on instances of such regulatory chill. It is natural to instead seek the answer by looking at the experiences from actual disputes, that is, from case law, since this is where the agreements are most visibly "in action". Natural as this may seem, there are some serious conceptual problems with this approach.

A main problem is that whenever there is regulatory chill, there will *not* be any dispute. Conversely, whenever there is a dispute, there will not be any regulatory chill. Hence, there is something fundamentally problematic with using dispute data to assess the restrictiveness of agreements.[10]

Yet another potential problem is that it is tempting to see arbitration panels' findings of violations as indicators of the restrictiveness of the various provisions. However, arbitration panels might have exercised *judicial economy*, that is, having established violations of some provision, the panels might have abstained from addressing alleged violations of other provisions. To the extent that this has occurred, the data will underestimate the amount of overlap between the provisions. But this is still the only data we have on the impact of different substantive provisions on host countries.

2.1 The agreements to be examined

We will now identify actual agreements with the above-mentioned problematic features. To this end we will use the mapping of the contents of bilateral investment agreements, provided by UNCTAD's International Investment Agreements Navigator.[11] It provides descriptions of the contents of 1 781 bilateral investments treaties that are in force between a total of 172 country parties. 63 percent of these agreements are between OECD and non-OECD countries, seven percent are between OECD countries, and the

[10] Another issue is that it is tempting to see the number of times that provisions have been invoked as indicators of their importance. However, once a dispute is launched, complainants can at relatively low cost invoke more provisions than those they believe are core of their complaints. We cannot determine from data on invocations the relative importance that the complainants have attached to the different provisions they have invoked.

[11] investmentspolicy.unctad.org/international-investments-agreements was webscraped 30/10/2023.

remaining 30 percent of agreements are between non-OECD countries. *These agreements and countries will constitute the data set for this study.* While our data set includes a large number of agreements, it still excludes many other agreements.

First, there are a further 438 bilateral investment agreements in force that have not been mapped in the UNCTAD-led project, and that therefore are excluded from this study.

Second, the UNCTAD database also includes 366 investment agreements that are classified as "treaties with investments protection" rather than as bilateral investment agreements, and that are in force. These agreements take a variety of forms. There are broader economic treaties that include obligations commonly found in bilateral investment agreements (e.g. a free trade agreement with an investment chapter). There are a number of agreements of this type that contain far-reaching compensation obligations. Unfortunately for our purposes, only 33 of these agreements are mapped in the UNCTAD-led project. We do not include this category of treaties in this study.

There are also treaties with limited investments-related provisions, such as provisions concerning the establishment of investments, or free transfer of investments-related funds. Another category is not included is treaties that only contain "framework" clauses regarding, for instance, cooperation in the area of investments. We are less interested in these agreements however, since they are less likely to impose a threat from a biodiversity perspective due to their weaker commitments.

Our focus on bilateral agreements covers an important part of the international investment regime, and thereby provides a baseline assessment of the threat to biodiversity posed by the agreements studied. However, there may be other agreements that also pose a threat to biodiversity that are missing from the analysis.

2.2 The criteria for agreements to be "inflexible"

15 criteria need to be fulfilled for an agreement to be of concern from a drafting perspective.

Substantive provisions The substantive provisions that we will focus on are those concerning fair and equitable treatment (FET), and indirect expropriation (IND). These provisions have often been criticized for being amorphously drafted in traditional agreements, and to have been interpreted in a highly investor-friendly manner by arbitration panels; the quote from the infamous *Tecmed* panel in Appendix A is a vivid illustration

of this with regard to FET.[12] We will thus require that an agreement includes both FET and IND to be considered as a potential threat to biodiversity. This makes our test demanding, since it would suffice if FET is included for an agreement to be of concern. But we will also have to take into account the restrictions on the ambits of these provisions that investment agreements sometimes include.

First, FET is sometimes qualified with reference to international law. However, this does not appear to be a major dent in the reach of the provision. But if the provision is qualified with listing of applicable elements, the freedom of arbitration courts to make far-reaching interpretations of the agreements, is significantly constrained. But since our ambition is to impose stringent conditions for an agreement to be considered as potentially restrictive, we will look for agreements for which the FET clause is described by the UNCTAD-led mapping project as follows:

1. FET type: "FET unqualified".
2. Reference to international law regarding FET: "None" or "Not applicable".
3. Listing of elements applicable to FET: "No" or "Not applicable".

Second, the indirect expropriation provision is sometimes accompanied with a carve-out for general regulatory measures, which should be expected to be a considerable restriction on the ambit it can be interpreted to impose. To capture the potentially most problematic agreements with regard to the indirect expropriation clause, we will therefore search for agreements with the following characterization in UNCTAD's mapping:

4. Indirect expropriation - Covered: "Indirect expropriation mentioned".
5. Indirect expropriation - Defined: "No".
6. Indirect expropriation - Carve-out for general regulatory measures: "No".

We will not explicitly include direct expropriation as a criterion since we are including indirect expropriation, and direct expropriation is always included whenever indirect expropriation is. This implies that agreements that include direct expropriation, but not indirect expropriation, will not be classified as inflexible, even if they fulfil all the other criteria. This is yet another reason why the bar for inclusion among the inflexible agreements is very high. We will not require Most-Favored Nation to be included, since

[12]FET is also the most often violated provision in disputes under the investment agreement the Energy Charter Treaty; see www.energychartertreaty.org/cases/statistics.

it seems implausible that host countries will want to discriminate in their biodiversity policies between foreign investors from different countries. Nor will we require the presence of a National Treatment provision among the substantive provisions, in light of how rarely their are findings of violations.

Carve-outs and exceptions The most potent restriction on the ambit of the substantive provisions seems to come from general exception clauses for environmental policies, similar to Article XX in the GATT. We conjecture that the mentioning of regulation in the text other than in preambles will be less important since it is of a less specific nature. The least support for host country interventions stems from mentioning in the preamble, since such statements are normally more or less disregarded by panels.

The UNCTAD mapping includes several features that can provide host countries with policy space. Since we aim for a test that only selects agreements that are highly problematic, we will require all of these characteristics to be fulfilled:

7. Preamble includes reference to right to regulate (e.g. regulatory autonomy, policy space, flexibility to introduce new regulations): "No".
8. Preamble includes reference to environmental aspects (e.g. plant or animal life, biodiversity, climate change): "No".
9. Health and environment (any mentioning in the text, except preamble): "No".
10. Right to regulate (any mentioning except in preamble): "No".
11. General public policy exceptions for health and environment: "No" or "Not applicable".

Dispute settlement We are interested in agreements with unconstrained ISDS mechanisms. We will thus select agreements based on the following characterization:

12. ISDS: "Yes".
13. Limitations of provisions subject to ISDS: "No" or "Not applicable".
14. Exclusion of policy areas from ISDS: "No" or "Not applicable".

Withdrawal The final criterion that will be employed concerns the conditions for unilateral withdrawals from the treaties. The agreements typically continue to apply for an extended "sunset" period after a party withdraws. If this period is short, the agreement need not be very constraining despite other constraining features. We therefore also include the following criterion:

15. The sunset period is 10 years or longer.

The definition of "inflexible" Based on the above we introduce the following definition, which will be fundamental to the analysis:

Definition 1 *An agreement will be denoted "inflexible" if it fulfills all 15 criteria above. The set of all inflexible agreements will be denoted "INFLEX."*

This is a demanding test. First, it requires that both substantive provisions are included in the agreement, despite the fact that including just one could impose a severe constraint. Second, it suffices with a general mention of the right to regulate in the preamble for the substantive provisions to fail the test, even though preambles have little impact on how panels interpret agreements. Third, the test requires that both substantive provisions appear without restrictions. Fourth, the test requires that there is not even a little-committing mentioning of a right to regulate etc in the preamble.

2.3 The pervasiveness of inflexible agreements

We have set a highly stringent criteria for investment treaties to be classified as inflexible. Applying this test to the treaties in our data set strongly suggests that there are reasons for concern regarding the potential impact of the treaties on biodiversity: of the 1 781 treaties in our data set, 995 meet the inflexible criteria.[13]

A further reason for concern is that a very large number of countries are bound by inflexible agreements: of the 172 countries that are parties to at least one of the 1 781 investment agreements in our data set, no less than 157 countries are party to at least one inflexible agreement.

These observations lead to rather stark conclusions:

Observation 1 *A majority if the investment treaties in our data set are characterized by potentially far-reaching substantive provisions, lack of carve-outs for regulatory policies,*

[13]To recall, the data comprises all in-force bilateral treaties that have been mapped by the above-described UNCTAD-led project.

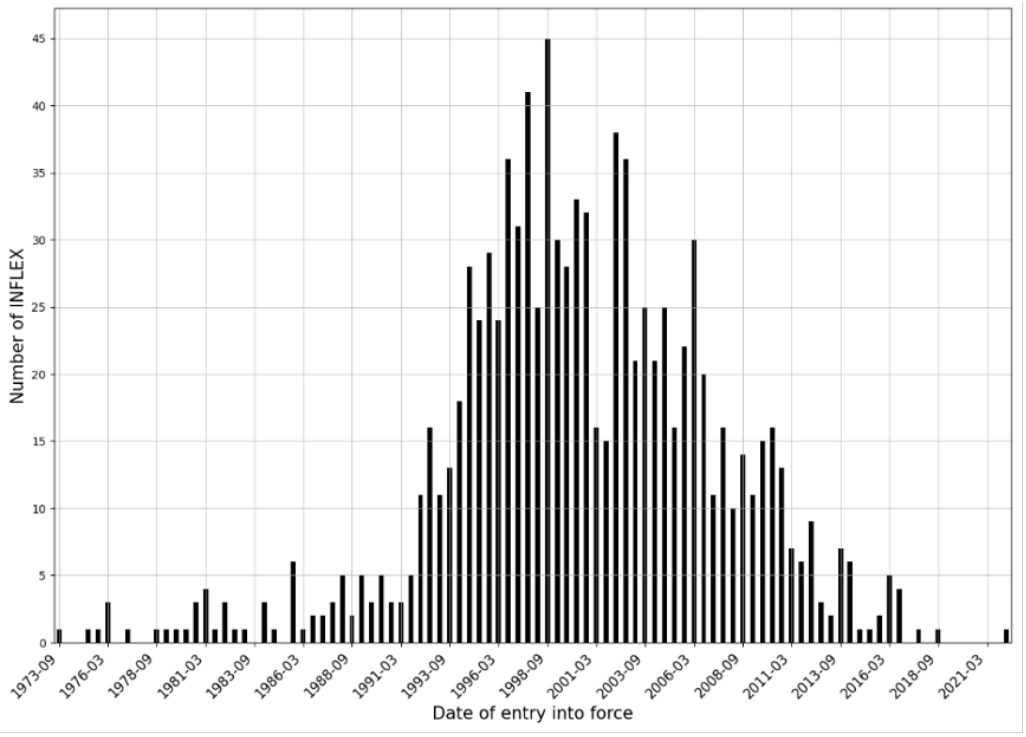

Figure 1: The evolution of the inflexible treaty regime

and unconstrained ISDS. Most countries in the data set are parties to at least one such agreement.

Bilateral treaties have been formed over a period of more than 60 years. But most of the inflexible agreements went into force between 1990 and 2010, as shown in Figure 1. This raises the question of whether current FDI positions are covered by these treaties. It is clear that investments that are made after the entry into force of an agreement between a source and a host country are covered by the agreement. The majority of treaties also apply to investments that were already in place at the time of the formation of the treaties. According to the UNCTAD mapping, 853 of the 995 inflexible agreements apply to investments made both before and after the treaty entered into force. A smaller number of agreements either apply only to investments made after they have entered into force (49), or that are silent on the issue (93). There could thus be instances where the inflexible treaties do not apply to some existing investments. However, since most of the agreements are at least 20 years old, these instances should be relatively rare given the normal life-span of investments.

The potential problems that countries may have with inflexible treaties are likely to be increasing in the number of such treaties that they are parties to. Table 1 lists the 30

countries that are parties to the largest number of inflexible agreements among all the 172 countries in the data set. The table gives a very clear picture:

Observation 2 *Developed countries heavily dominate the group of 30 countries that are signatories to the largest number of inflexible agreements.*

Another striking feature of the table is that the distribution of inflexible agreements is concentrated amongst relatively few countries.

Table 1: The 30 countries that are parties to the largest number of inflexible agreements

Country	**# INFLEX**
United Kingdom	70
Switzerland	68
South Korea	60
Netherlands	53
China	45
Germany	44
Czech Rep.	44
Egypt	43
Argentina	42
Austria	38
Italy	32
Russian Fed.	31
Morocco	31
Sweden	30
Chile	29
Denmark	29
Belarus	29
Turkiye	28
Romania	28
Portugal	27
Israel	27
Lebanon	27
Tunisia	27
Serbia	25
Albania	24
Hungary	24
Finland	24
Philippines	23
Spain	23
Thailand	23

Note: The table is based on the 172 countries that are parties to the 1 781 in force, BITs, mapped by the UNCTAD led project.

3 Identifying protected FDI stocks

The previous section identified countries that are bound by inflexible agreements. The threat to biodiversity protection that is posed to these countries will plausibly also depend on the *magnitudes of the host country's FDI positions that are protected* by these agreements. It would be desirable to observe FDI positions between each country pair in our dataset so as to identify not only the magnitude of the FDI position but also the magnitude of the position in the host country. However, there are several conceptual and practical problems related to the assessment of the interaction of FDI, inflexible agreements and regulatory chill.

3.1 Conceptual issues

It is clear that a complete lack of FDI under an agreement implies that the agreement will not cause regulatory chill as long as there is no new investment: there is little scope for investors to claim compensation from a host country if there are no foreign-owned assets covered by the agreement. However, it is less clear how this threat varies as we increase the stock of FDI that is protected. One can identify several partial effects from the size of the investment on biodiversity.

For instance, one should expect that on average, larger investments cause a larger adverse direct, *physical* impact on biodiversity. But the size of the investment will also affect host country's *incentives to protect* biodiversity. On the one hand, a large investment that causes significant harm to biodiversity provides a stronger incentive for the host country to intervene regardless of an agreement. On the other hand, a larger investment could result in significant compensation payments to the investor should the host country choose to regulate, which would tend to dissuade the host country from regulating to protect biodiversity. While the net effect of the size of the investment in principle could go either way, it intuitively seems plausible that the larger the protected investments, the larger the expected compensation payments would be in case of regulation of stranded investments, which would make regulatory chill more likely. We will thus assume that *larger investments pose a greater threat to biodiversity, all else given.*

Another conceptual issue stems from the fact that FDI positions constitute a small fraction of the total investment positions in many, but certainly not all, countries. When this fraction is small, the damage to biodiversity is likely to come mainly from domestically-owned production. Since these investments are not protected by investment agreements, the host countries are free to address the majority of the damage by regulat-

ing domestically-owned production, while giving regulatory exceptions to foreign owned productions, without violating their treaties.[14]

But while it is legally feasible to discriminate against domestic investment, and this could have the benefit of targeting the activities that are causing the bulk of the biodiversity damage, we believe that this would normally be met with fierce political opposition domestically for host countries. We therefore assume that foreign-owned activities must for political reasons be regulated as least as firmly as foreign investment.

A related issue is that the damage to biodiversity from investment of any given magnitude will depend on the characteristics of the investment. For instance, there is (albeit mixed) evidence that foreign-owned manufacturing firms are more environmentally-friendly than domestic counterparts.[15] It is therefore possible that biodiversity regulation can hit domestic investments harder than foreign investments, which would in effect give a competitive advantage to the foreign investments. But even if this is the case, it still seems likely that regulation to protect biodiversity will reduce profits of foreign investors, and might thereby be compensable.

The impact on biodiversity protection from any given magnitude of investment is also likely to depend on the industry. For instance, mining is often found to be particularly damaging; see the commentary by Sonter et al. (2018) and the work by Junker et al. (2024). To add to the problem, in mining the share of foreign ownership is very high. The biodiversity impact of an investment can differ significantly in various dimensions although tracking the varying impacts of investments requires a level of data detail that is difficult or even impossible to obtain. We discuss data issues in the next section.

3.2 Data issues

A complicating factor when bringing investments into the analysis is the shortage of high quality data. We will use the investment data provided by the OECD for 2019.[16] The data gives inward and outward FDI positions with partner countries in current USD, as reported by OECD countries. This includes inward and outward FDI positions between OECD countries, and between OECD and non-OECD countries. The OECD is

[14]If an agreement includes a National Treatment non-discrimination provision, it only requires that the protected foreign investment is not treated more unfavorably than domestic investment.

[15]There is an empirical literature that examines the environmental implications of FDI. While the overall evidence is mixed, more recent work tends to find that there are significant positive environmental spillovers from foreign to local firms, see the review of the literature by Cole et al. (2017).

[16]FDI data downloaded from OECD in November 2023, Benchmark Definition 4th edition bilateral gives FDI positions by reporting and partner countries (stats.oecd.org).

a baseline source of FDI data with sufficient inter country-level coverage that we require for our global analysis of biodiversity threats.

The total FDI positions protected by inflexible agreements in our data set is USD 1.34 trillion. Yet, from what we can observe, 566 (429) of the 995 inflexible agreements cover no (positive) FDI positions. Moreover, most of the inflexible agreements that do cover positive FDI positions cover investment from OECD to non-OECD countries; specifically, 368 of these 429 inflexible agreements cover USD 1.05 trillion of such FDI positions. The remaining 61 agreements cover USD 289 billion of investment between OECD countries. Hence, the majority of the FDI positions that are covered by inflexible agreements are from OECD to non-OECD. However, these aggregates are rather small compared to the total aggregate outward FDI positions that OECD countries have. The total FDI positions protected by inflexible agreements thus accounts for approximately five percent of the total FDI outward positions for OECD countries.

The FDI data does not include observations on the inward and outward FDI positions between non-OECD countries. This is for the most part probably not a major issue for the purpose of this study, since there is relatively little FDI between most non-OECD countries. There is one very important exception, however: outward Chinese FDI positions in non-OECD countries are not covered by the OECD data.

The OECD data also omits observations that are considered non-publishable for confidentiality concerns. We note these instances but treat them as zeros for the purpose of our analysis.

Another complicating factor with this data is that the observations include only aggregate inward and outward positions between reporting and partner countries. As noted above, biodiversity protection efforts can target a wide range of harmful activities, which makes it difficult to predict the sectors that would be affected by these policies. Certain sectors such as mining, forestry, fisheries and agriculture can have important negative impacts on biodiversity, which would suggest a higher exposure to transition risks arising from biodiversity related policies. But other sectors could also be exposed in this way. The OECD does provide sectoral FDI data but the increase in detail comes at the cost of the countries covered by the data. We have opted for data that provides greater global coverage.

4 Identifying countries with vulnerable biodiversity

As stated above, the purpose of the study is to identify the countries that from a global perspective have the most severe problems with biodiversity loss, and are bound by inflexible investment treaties that protect significant foreign investment positions. We therefore need a measure that captures the severity of the problems in different countries from a global perspective.

The International Union for the Conservation of Nature and Natural Resources (IUCN) evaluates the conservation status of a sample of species from different taxonomic groups, such as birds, mammals, amphibians, and reptiles. The sample is chosen to be representative of the overall diversity of species, and includes both widespread and narrowly distributed species. 26 198 species are included in the most recent assessment of December 2023.[17]

For each species in the sample, the IUCN assesses its extinction risk using a standardized set of criteria, which considers factors such as population size, changes in population size, types of threats, and geographical range size. Based on the findings, the IUCN compiles a Red List of Threatened Species. Although criticized on various grounds, it is the most prominent and comprehensive assessment of the threat to biodiversity.

The IUCN assessment classifies species on a nine-step scale according to the risk of extinction at a global level. These classifications "Least Concern", "Near Threatened", "Vulnerable", "Endangered", "Critically Endangered", and "Critically Endangered (Possibly Extinct)", and three similar categories.[18] These classifications are used to compute the well-known Red List Index.

4.1 The EXT index for biodiversity vulnerability

In what follows we will define a measure of biodiversity sensitivity that is based on these IUCN classifications. The measure to be define will be similar but not identical to the national Red List index that the IUCN compiles; see Appendix B for a discussion of why we adapt the IUCN measure to fit the purpose of this study.

Our index captures the expected number of species extinctions in a country, and in this way is a measure of the damage to biodiversity caused by various economic activities. The index applies the above-described IUCN extinction risk classifications as *probabilities*

[17]The input assessment data for the Red List were generously provided by IUCN's Red List Unit.

[18]For a description of methodological aspects of the construction of this data, and the criteria for the classification scheme, see Bland et al. (2017).

of extinction for the assessed species at the global level, to be denoted w_s for species s. This interpretation is partly in line with the defining criteria for the IUCN classification scheme, since the latter is partly based on such probability assessments.[19]

We will focus on the categories ranging between Near Threatened and Extinct. We will disregard the category Least Concern for natural reasons. Largely in line with the weights that the IUCN attaches to these categories when computing the Red List Index, we will assign the following numerical weights/probabilities to these categories:

- Near Threatened: .2;
- Vulnerable: .4;
- Endangered: .6;
- Critically Endangered: .8;
- Extinct: 1.0

The species classifications are made at the global level, as mentioned. To identify the portion of the threats to each species that falls on each country, we will also use IUCN data on the *ranges* of the various species, which is provided at a national level. We will hence for each country c compute the global probability w_s of extinction of species s times the share h_{sc} of the global stock of the species that range in the country: $\sum_s w_s h_{sc}$. Since the summation is over all species, and there is a very large number of species, it is practical to normalize these values, which can be done without changing the relative order among countries, by dividing these values by the maximal $\sum_s w_s h_{sc}$. With S being the set of all species, and C the set of all countries, our measure will thus be as follows:

Definition 2 *The Expected Number of Species Extinctions (EXT) for country c is*

$$EXT_c \equiv \frac{\sum\limits_{s \in S} w_s h_{sc}}{\max\limits_{c \in C} \left(\sum\limits_{s \in S} w_s h_{sc} \right)}. \tag{1}$$

These values will range between 0 and 1, with larger values corresponding to a larger expected number of country specific species extinctions.

[19] In the same spirit, Taylor and Weder (2023) adapt Red List data for their economics-based assessment of extinction paths of bisons and sharks.

It is important to note that the EXT measure is not based on country-specific assessments of extinction risks, but on assessments of global species extinction risks that are disaggregated across countries.[20] But we are not aware of any systematic data of a similar global coverage that evaluates country-specific extinction risks.

4.2 The diversity of the countries with high EXT values

Let us next consider the indicator for extinction risks, EXT. There are 254 countries for which IUCN provides species-level data on extinction risks and ranges. This is brings an additional 76 countries over what is covered in our 172 country data set of in force, BITs, mapped by UNCTAD. Table 2 lists the 35 countries with EXT ≥ 0.10.

A first observation that can be made about the EXT values is that none of the additional 76 countries enter the list of countries with EXT ≥ 0.10. Hence, the higher EXT values are entirely confined to countries that are included in our investment agreement mapping data.

Another finding is that the distribution of the EXT values among the countries in our data set is quite skewed. Many of the 219 countries with EXT < 0.10, while not shown here, have EXT values very close to the minimum value of zero.

Turning to countries with EXT ≥ 0.10, Mexico has the largest expected number of species extinctions, and thus has an EXT value of one as a result of the normalization. But Mexico is closely followed by Indonesia, Brazil, and Colombia.

The countries with EXT ≥ 0.10 include some of the largest countries in terms of geographic size, including China, the United States, Brazil, Australia , India, and Argentina. This is not surprising, since a large territory should all else equal yield a tendency toward harboring many species. Other very large countries (within the world's largest 14) that also make the EXT ≥ 0.10 list include D.R. Congo, Mexico, and Indonesia.

[20] Rodrigues et al. (2014) discuss the approach taken to downscale global species assessments to national levels, and are cited as a key reference in IUCN Red List guidance documentation.

Table 2: Countries with EXT ≥ 0.10

Country	EXT
Mexico	1.00
Indonesia	1.00
Brazil	0.98
Colombia	0.92
Ecuador	0.82
Madagascar	0.72
India	0.57
China	0.57
Australia	0.52
Peru	0.49
United States	0.49
Venezuela	0.42
Philippines	0.39
Tanzania	0.28
Sri Lanka	0.26
Papua New Guinea	0.25
Vietnam	0.25
Panama	0.24
Guatemala	0.23
Malaysia	0.23
Japan	0.22
Cameroon	0.22
Honduras	0.22
South Africa	0.20
New Zealand	0.20
Cuba	0.19
Bolivia	0.18
Argentina	0.18
Chile	0.14
D.R. Congo	0.13
French Polynesia	0.13
Costa Rica	0.12
Haiti	0.12
Mauritius	0.11
Ethiopia	0.10

Note: The table is based on the 254 countries covered by IUCN's biodiversity assessment data from January 2024.

Geographical size is not the sole factor determining the EXT values, however. There are some large countries that have relatively low EXT values. Most noticeable is that the world's largest country, Russia, does not have EXT ≥ 0.10. Likewise, there are also some geographically rather small countries with EXT ≥ 0.10, such as Honduras, Cuba, Guatemala, and Panama.

The countries with EXT ≥ 0.10 are also diverse in terms of income per capita levels. There are six OECD countries: Australia, Chile, Colombia, Japan, Mexico, and the United States; this group is thus dominated by countries in the Americas. But there are also three least-developed countries: D.R. Congo, Madagascar, and Tanzania.

The countries with EXT ≥ 0.10 furthermore encompass some of the world's largest economies, such as China, the United States, and Australia, as well as some very small economies, such as Madagascar and Haiti. In terms of the continents represented, Europe is conspicuous in its absence.

It is thus hard to find distinguishing features for the countries with EXT ≥ 0.10:

Observation 3 *The countries with EXT* ≥ 0.10 *are highly diverse in terms of income per capita, national income, geographical size, and the continents to which they belong.*

5 Findings

Section 2 identified the agreements that we deem to be poorly drafted from a host country perspective, Section 3 discussed FDI data, and Section 4 defined our measure of the vulnerability of countries' biodiversity. This section will bring these indicators together.

To recapitulate, we interpret the EXT indicator to capture expected extinction risks in a "business-as-usual" scenario in which no serious attempts are made to protect biodiversity, and in which the investment treaties thus have not had any significant impact. The threat from the treaties arises when host countries with severe biodiversity problems are constrained from phasing out biodiversity harmful by inflexible agreements, which may impose large investor compensation claims. For such claims to be made however, requires that there are fact investments protected by inflexible agreements. If there is no such stranded investment protected by a treaty, the treaty regime will not have any effect in this regard. On the other hand, in countries where large investment positions are protected by treaties, the potential chilling effect can be considerable.

In what follows, Section 5.1 will identify the *countries* where biodiversity is particularly threatened, as indicated by our indicators for extinction risks, and their aggregate inward investment positions protected by inflexible agreements. Section 5.2 will examine a number of additional country features that can affect the threat the investment regime poses to biodiversity. Section 5.3 will identify the *agreements* that seem to pose the main threats.

5.1 The most threatened countries

The stage is now set for addressing the first of our two main questions: in which *countries* does biodiversity appear to be most threatened by the investment treaty regime?

It seems highly plausible that the threats that countries are exposed to from the investment protection regime are increasing with the vulnerability of their biodiversity; this factor is meant to be captured by the EXT index. The threats will also depend on the total magnitude of the investment positions in the country that are protected by inflexible agreements.

Country biodiversity is clearly most exposed to this threat if they score high on both EXT and levels of investment protected by inflexible treaties. But we have no basis for taking a stand on the relative importance of these factors in determining the likelihood of regulatory chill: the agreements can pose risks both for countries with highly vulnerable biodiversity, but smaller investment positions, and for countries with less threatened biodiversity, but very large investment positions. We keep this consideration in mind throughout the analysis.

Let us first consider the distribution of host countries along these dimensions graphically. Figure 2 plots the EXT value, and the aggregate volume of inward FDI positions that are covered by inflexible agreements, for each of 157 countries with at least one inflexible agreement in our data set. Importantly, the plot excludes China and China-Hong Kong, since these are outliers in terms of protected inward FDI stocks. China has over USD 300 billion in FDI positions that are covered by inflexible agreements, and China has the eighth highest EXT value, so it is one of the countries that appear to be among the most problematic with regard to biodiversity, despite its exclusion from the Figure. China-Hong Kong also has very large inward FDI positions, but its EXT value is close to zero. Including these observations compresses the vertical scale, making the figure less informative with regard to remaining countries.

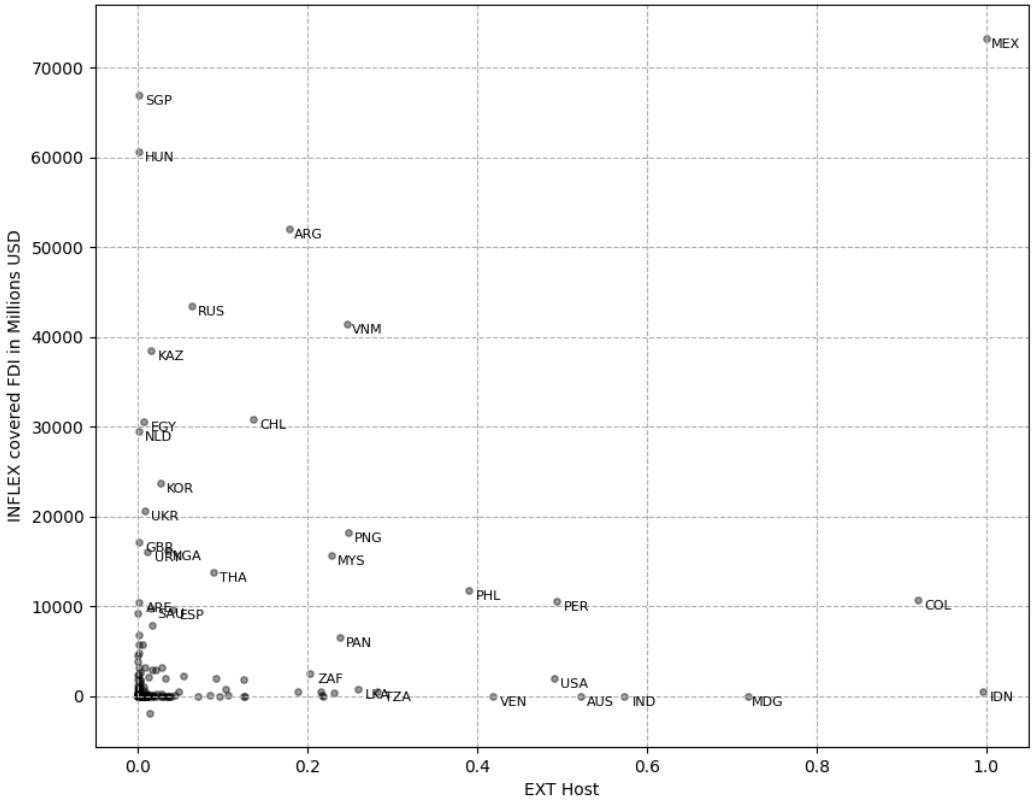

Figure 2: Aggregate inward FDI positions covered by inflexible agreements vs. host country EXT. Note: ISO3 country codes. China and Hong Kong are excluded

As can be seen from the figure, most countries have low EXT values and aggregate investment positions of less than USD 5 billion; these countries are indicated with unlabeled dots in the figure for display reasons. However, there are some countries that stand out as having relatively high values on both axes.

Table 3 lists the inward FDI positions for countries with EXT values equal to, or exceeding, .10.[21] The table shows that these countries vary significantly in the aggregate inward FDI positions that are protected by inflexible agreements. Several of the countries have hardly any such investment, according to our data, while other have very large

[21]There is not a complete overlap with the countries in Table 2 partly since the latter table only provides data for the countries with EXT ≥ 0.10, and Table 4 includes only countries with at least one inflexible agreement.

stocks, and this latter group is what we focus on. Also, approximately 44 percent of the inflexible agreements cover positive investment positions.

Table 3: Aggregate inward FDI positions covered by inflexible agreements for countries with EXT $\geq .10$

Host	**EXT host**	**Inward FDI positions covered by INFLEX**
Mexico	1.00	73261
Indonesia	1.00	481
Colombia	0.92	10700
Madagascar	0.72	-8
India	0.57	0
China	0.57	308064
Australia	0.52	28
Peru	0.49	10541
United States	0.49	1963
Venezuela	0.42	0
Philippines	0.39	11718
Tanzania	0.28	526
Sri Lanka	0.26	763
Papua New Guinea	0.25	18234
Vietnam	0.25	41395
Panama	0.24	6531
Guatemala	0.23	306
Malaysia	0.23	15632
Japan	0.22	0
Cameroon	0.22	110
Honduras	0.22	457
South Africa	0.20	2499
Cuba	0.19	550
Argentina	0.18	52079
Chile	0.14	30779
D. R. Congo	0.13	0
Costa Rica	0.12	1823
Haiti	0.12	-1
Mauritius	0.11	48
Ethiopia	0.10	822
Dominican Rep.	0.10	9
	SUM:	589310

Note: The table is based on the 157 countries that are parties to at least one inflexible, in force, bilateral investment agreement, mapped by the UNCTAD led project. FDI positions are reported in millions of current 2021 USD.

To identify the countries that appear to be most threatened by their investment

treaties, we will focus attention to the following set of countries:

Definition 3 *The "most threatened countries":*
- have aggregate inward FDI positions exceeding USD 2 billion;
- are protected by inflexible agreements; and
- have EXT values exceeding .10.

Of course, these cut-off values are arbitrarily chosen, and as will be discussed below, other countries might also be threatened. The 12 countries that fulfil these criteria are listed in Table 4. These host countries hence combine vulnerable biodiversity with large inward FDI positions that are covered by inflexible agreements.

Table 4: The most threatened host countries

Host	**EXT host**	**Inward FDI positions covered by INFLEX**
China	0.57	308064
Mexico	1.00	73261
Argentina	0.18	52079
Vietnam	0.25	41395
Chile	0.14	30779
Papua New Guinea	0.25	18234
Malaysia	0.23	15632
Philippines	0.39	11718
Colombia	0.92	10700
Peru	0.49	10541
Panama	0.24	6531
South Africa	0.20	2499
	SUM:	581433

Note: The table is based on the 157 countries that are parties to at least one inflexible,in force, bilateral investment agreements, mapped by the UNCTAD led project.

The 12 most threatened countries vary considerably in terms of per capita incomes. According to the World Bank classification of countries based on gross national income per capita, Chile and Panama are high income countries; Philippines, Vietnam and Papua New Guinea are lower-middle income countries, and the remaining countries are upper-middle income. The only category that is not represented is thus low income countries.

The most threatened countries also vary considerably in the magnitude of the inward FDI positions, which are highly concentrated:

Observation 4 *The inward FDI positions of from OECD countries that are protected by inflexible agreements are largely concentrated to a few countries. For countries with with* $EXT \geq .10$*:*
- China (excluding Hong Kong and Macao) accounts for 52 percent of the positions, and
- the top 5 countries account for 86 percent,
- the top 11 countries account for 98 percent

A striking feature is the dominance of China. As was shown in Table 2, China ranks as number 8 of 254 countries with regard to EXT scores, and China is party to 45 inflexible agreements, as shown by Table 1. There are several natural explanations for China's dominance in this regard. One obvious contributing factor is that China is geographically large, which contributes to its higher EXT score. Another factor is that China is among the largest economies, and thereby naturally attracts large inward FDI stocks.

Also striking is Mexico, which has both the highest EXT value among 254 countries, and the second largest aggregate inward FDI positions that are protected by inflexible agreements, despite being party to only five such agreements.

Our OECD data does not provide country specific observations on foreign investment positions by industrial sector. However, there are certain general characteristics of the industrial structure of the most threatened countries that should be informative of where the threats to biodiversity might come from in these countries:

- The expansion of *agriculture* has caused deforestation and habitat fragmentation in almost all of the most threatened countries. While foreign investment in this sector in many of the countries is low (relative to e.g. mining, see below), the rapid expansion of agricultural production has put pressure on biodiversity, for instance through forest clearings.

- The majority of the most threatened countries have significant *extractive* industries, including mining of minerals and metals, and oil and gas extraction.[22] Foreign ownership in the sector is important in e.g. Argentina, Chile, Colombia, Malaysia, Mexico, Panama and Papua New Guinea, the Philippines, Peru, and South Africa.

- Almost all of the most threatened countries have gone through industrialization processes during the last two or three decades. Several of the countries, including

[22]See Sonter et al. (2018) and Tienhaara (2019) for analyses of the impact of mining on biodiversity.

China, Mexico, the Philippines, South Africa, and Vietnam, today have extensive *manufacturing* sectors with considerable foreign ownership. This rapid expansion has likely put pressure on biodiversity.

- Many of the countries on the list have significant coastal waters and are involved in commercial *fishing* or *aquaculture*. Foreign ownership in these countries is important in e.g. Argentina, Chile, Peru, Vietnam, Philippines, and Papua Guinea.
- Finally, some of the most threatened countries, including Chile, Malaysia and Papua New Guinea, have *forestry* industries with significant foreign ownership.

The most problematic host countries are therefore potentially exposed to foreign owned investment activities that are known to cause adverse biodiversity impacts. Deriving more specific and conclusive insights require more granular data because the biodiversity impact of various economic activities varies importantly with the location and nature of the activity. The country-level FDI observations provide a blunt indication of potentially problematic investments with the advantage of global coverage as we have already noted. Sector-level FDI observations would provide further refinement.

5.2 Other host country features that can affect the threat from the agreements

The analysis above was based on three indicators at the agreement and country levels that we believe capture essential aspects of the threat that investment treaties pose to biodiversity, namely: inflexible agreements; EXT scores; and large protected investment positions.

However, other factors can also likely affect the threat that the agreements pose. This section will consider several additional country-level characteristics as a check that our "most problematic" criteria has not missed important instances.

5.2.1 Many inflexible agreements

The most threatened countries listed above were identified by the aggregate investment positions that are protected by their inflexible agreements, but we did not considered the *number* of such agreements to which countries are parties to.

There are reasons to also be concerned about the number of inflexible agreements. One reason is that the investment data is beset with both conceptual and practical problems,

as discussed in Section 3. For instance, some FDI positions are not reported because of confidentiality concerns, and would thus appear to not exist in the analysis above. Since each inflexible agreement adds a separate group of investors that could seek compensation from a host country, accounting for the total number of such agreements could be an, admittedly imperfect, way of capturing this.

Being party to a large number of inflexible agreements can also increase the possibility that a country is exposed to *treaty shopping* by investors from other countries that are not contracting partners.[23] Since there are limits to how obvious such maneuvers by investors can be while still being accepted by arbitration panels, one should expect that the possibility for treaty shopping is increasing in the number of agreements that a country is party to.

Figure 3 plots country EXT scores against the number of inflexible agreements that countries party to, for the 157 countries that are parties to at least one inflexible agreement in our data set. It shows a fairly dispersed pattern, although most observations are either very close to the origin, or along the vertical axis with low EXT scores.

Table 5 lists the 15 countries that are parties to 10 or more inflexible agreements with EXT ≥ 0.10. It shows that there is significant overlap between the group of most threatened countries and the countries with many inflexible agreements:

Observation 5 *Nine of the 12 most threatened countries reported in Table 4 have at least 10 inflexible agreements. Only Colombia, Mexico and Papua New Guinea have fewer inflexible agreements.*

It would thus appear that the majority of the most threatened countries are also of concern in terms of the number of inflexible agreements that they are parties to.

[23] A stylized example of treaty shopping is the following. An investor from country A want to make an investment in country B, but would then not be protected by the agreement between B and C. But by establishing a letter-box company or similar in country C, the investment can come under the protection of the agreement.

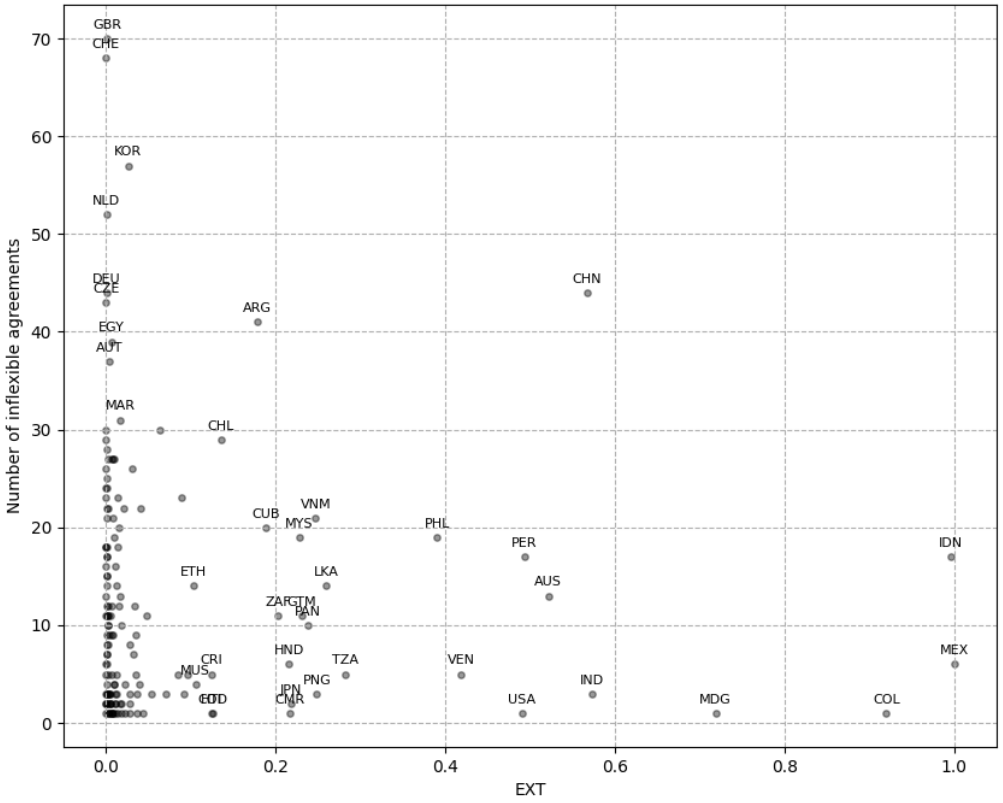

Figure 3: Country EXT versus the number of inflexible agreements for the 157 countries that are party to at least one inflexible agreement

Table 5: Countries with EXT ≥ 0.1 that are parties to 10 or more inflexible agreements

Country	EXT	# INFLEX
China	0.57	44
Argentina	0.18	41
Chile	0.14	29
Vietnam	0.25	21
Cuba	0.19	20
Philippines	0.39	19
Malaysia	0.23	19
Indonesia	1.00	17
Peru	0.49	17
Sri Lanka	0.26	14
Ethiopia	0.10	14
Australia	0.52	13
Guatemala	0.23	11
South Africa	0.20	11
Panama	0.24	10

Note: The table is based on the 157 countries that are parties to at least one inflexible,in force, BITs, mapped by the UNCTAD led project.

This raises the question of whether there are countries with a large number of inflexible agreements that have not been designated to the group of most threatened countries. There are indeed six such countries. Australia, Cuba, Guatemala, Indonesia, South Africa and Sri Lanka each have at least 10 inflexible agreements, but are not on the list of most threatened countries. They have EXT values that raise a warning flag, and in the case of Indonesia very much so, since it has an EXT value of unity. However, as was shown in Table 4, these countries have quite modest inward FDI positions, the largest being Sri Lanka with USD 763 Million, and Indonesia second with USD 481 million. Insofar as the FDI data are correct, these six countries should not be of greater concern.

As noted however, the investment data are incomplete, and cover only those FDI positions involving at least one OECD country. Chinese investments in Indonesia (or any other biodiversity threatened country) could therefore be a serious threat to biodiversity given the vulnerability of the Indonesian biodiversity, and the magnitude and growth of Chinese investments. These investments are not captured here.

5.2.2 High FDI-to-government revenue ratio

The analysis above has been based on the notion that, all else given, larger investment positions tend to make host countries less willing to protect biodiversity, since they can lead to larger compensation claims by investors. However, it seems plausible that regulatory chill will be more acute when for expected compensation payments are large relative to host country government financial resources.

Table 6 reports the ratio of inward FDI positions protected by inflexible agreements to government revenues for countries with EXT $\geq$ .10 and inward FDI positions exceeding USD 500 billion. All 12 most threatened countries except for China, for which we have data on government revenue, have FDI positions that amount to at least 20 percent of government revenue. For four countries—Mexico, Argentina, Vietnam and Chile—the ratio is over 50 percent. This confirms their designations as countries of concern.

Observation 6 *All threatened countries, except for China, have inward FDI positions that are protected by inflexible agreements corresponding to 20 percent or more government revenue for 2021.*

5.2.3 Many agreements that are not classified as inflexible

We have thus far focused on inflexible agreements. But the criteria for 'ìnflexible" is very stringent, and arbitration panels can interpret agreements that do not meet all 15 criteria to impose severe restrictions. It is therefore of interest to also consider agreements that are not inflexible. Somewhat awkwardly, we will denote them with the double negation "non-inflexible," since it would be inappropriate to call them "flexible."

The total volume of investment that is protected by non-inflexible agreements in our data set is USD 1. 128 trillion, and is thus about as large as the volume protected by inflexible agreements (USD 1.340 trillion). Table 7 lists the number of non-inflexible agreements, and the aggregate inward FDI positions that are protected by such agreements, for countries with EXT values exceeding .10. It has a striking feature:

Observation 7 *Nine of the 12 most threatened countries have non-inflexible agreements protecting more than USD 5 billion of inward FDI positions.*

Indeed, China has 41 such agreements, Mexico 23, Vietnam 14, and Peru nine. This observation thus reinforces the case for that the problematic host countries that were identified above, are the countries of main concern.

Table 6: FDI positions covered by inflexible agreements relative to government revenue for countries with EXT $\geq .10$ and FDI positions $\geq$ USD 500 billion

Host country	EXT	Inward FDI positions covered by INFLEX	% of government revenue
Vietnam	0.25	41395	126
Argentina	0.18	52079	80
Chile	0.14	30779	76
Mexico	1.00	73261	54
Malaysia	0.23	15632	36
Peru	0.49	10541	33
Colombia	0.92	10700	23
Philippines	0.39	11718	21
Costa Rica	0.12	1823	16
China	0.57	308064	12
Tanzania	0.28	526	10
Sri Lanka	0.26	763	9
Ethiopia	0.10	822	8
South Africa	0.20	2499	4
Cuba	0.19	550	1
United States	0.49	1963	0

Note: FDI positions are in millions of current 2021 USD. Government revenue in current 2021 USD obtained from IMF data at data.imf.org, accessed on 12 April 2024.

There is in fact a tendency for countries with a large number of inflexible agreements to also have many non-inflexible agreements. Of the 157 countries in our data set (which includes countries that have only one type of agreement), the correlation between the number of inflexible and non-inflexible agreements is .42, which is quite high.

It is also noteworthy that some countries that rank high in terms of EXT score, and that thus should have vulnerable biodiversity, also have many non-inflexible agreements. For instance, the United States with an EXT value of .49 has 38 such agreements, and Venezuela with an EXT score of .42 has 19 such agreements.

Table 7: Non-inflexible agreements for host countries with EXT $\geq .10$

		Non-INFLEX	
Host	**EXT**	**#**	**FDI covered**
China	0.57	41	534499
United States	0.49	38	10732
Japan	0.22	26	14772
Mexico	1.00	23	178088
Mauritius	0.11	20	7313
Venezuela	0.42	19	8166
Malaysia	0.23	19	43620
Vietnam	0.25	14	71464
Cuba	0.19	9	558
Sri Lanka	0.26	9	1490
Peru	0.49	9	27519
Philippines	0.39	8	17094
Cameroon	0.22	8	530
Costa Rica	0.12	8	9753
Argentina	0.18	7	70200
Ethiopia	0.10	7	1208
Colombia	0.92	7	18973
Guatemala	0.23	7	1453
Panama	0.24	7	16560
Madagascar	0.72	6	202
Chile	0.14	5	50836
Tanzania	0.28	5	825
India	0.57	4	14
D.R. Congo	0.13	4	0
Haiti	0.12	2	2
Papua New Guinea	0.25	2	18245
Honduras	0.22	2	1708
Indonesia	1.00	2	13443
New Zealand	0.20	0	0
Bolivia	0.18	0	0
Australia	0.52	0	28
French Polynesia	0.13	0	0
Ecuador	0.82	0	0
South Africa	0.20	0	2499
Brazil	0.98	0	0
		SUM:	1121794

FDI positions in millions of current 2021 USD.

5.2.4 Least developed country status

One should expect the poorest countries to be particularly vulnerable to regulatory chill. For instance, they have very limited government budgets, and they also typically lack the legal resources to handle investment disputes. Also, some of the poorest countries have rich biodiversity—we will expand on this aspect below. They are furthermore often rich in natural resources, and can thus be attractive from an investment perspective in industrial sectors that can be harmful to biodiversity. All these factors suggest that biodiversity might be at particular risk in the poorest countries.[24]

To examine the role of the poorest countries, we will consider the 45 countries that the UN identifies as *least developed* (LDCs). Table 8 provides data on their EXT values, the number of inflexible and non-inflexible agreements to which they are parties to, and the aggregate inward FDI protected by inflexible and non-inflexible agreements.

A first striking observation is the absence of LDCs from the group of most threatened countries identified in Table 4.

Observation 8 *There is no LDC among the 12 most threatened countries.*

A second striking observation is that most LDCs have low EXT values are: only Madagascar (.72), Tanzania (.28), D.R. Congo (.13), Haiti (.12), Ethiopia (.10) and Solomon Islands (.10) have EXT values .10 or above. Hence, 39 out of the 45 LDCs have EXT scores of less then .10. However, this might reflect the difficulties associated with biodiversity assessments in poor countries, than the actual state of their biodiversity.[25] Amongst these six high EXT LDCs, only Ethiopia and Tanzania have inward investment positions that are protected by inflexible agreements.

A third striking observation is that the inward FDI positions covered by inflexible agreements are small, at least when set against the the inward positions of many other countries. Positive inward FDI positions are concentrated to a handful of countries: Uganda, Mozambique and Bangladesh alone account for 75 percent of the inward FDI positions in LDCs that are protected by inflexible agreements.

Among the six countries with EXT scores higher than .10, only Ethiopia and Tanzania has a positive inward FDI position. Given the dire economic situations in these countries, even modest levels of inward FDI positions could reflect significant vulnerabilities to regulatory chill.

[24]Fisher et al. (2007) discuss the interaction between poverty and biodiversity.
[25]See e.g. Barlow et al. (2018).

Fourth, a few LDCs stand out as having a significant number of inflexible agreements. Bangladesh, Cambodia, Laos, and Yemen, all have 9 or more such agreements. But most noteworthy here, in light of the findings with regard to FDI stocks, is Ethiopia, with 14 such agreements.

Fifth, a somewhat reassuring feature of Table 8 is that LDCs have almost twice as large investment positions under the protection of non-inflexible agreement (close to USD 16 billion) as compared to under the protection of inflexible agreements (just below USD 9 billion).

Sixth, with regard to the positions that are protected by non-inflexible agreements, Myanmar stands out as having by far the largest stocks. But Myanmar has a low EXT value, so it should be of less concern from a biodiversity perspective. This holds a fortiori for Senegal and Bangladesh, which have the second and third largest such stocks.

Observation 9 *The vast majority of the LDCs that are parties to at least one inflexible agreement have low EXT scores. Only Ethiopia and Tanzania have EXT values exceeding .10 and positive inward investment positions protected by such agreements.*

5.2.5 Biodiversity richness

The UN's World Conservation Monitoring Center identifies 17 countries with "megadiverse" biodiversity. These countries are each home to at least 5 000 endemic species of plants, and contain a marine ecosystem within their borders and are home to approximately 70 percent of the world's biodiversity.[26] These countries are of interest for two reasons, at least.

First, it would be an additional verification of our designation of the countries in Table 4 as most threatened countries, if they are also classified as megadiverse.

[26]See the United Nations World Conservation Monitoring Centre for more information.

Table 8: LDCs' exposure to investment treaties

Host LDC	EXT	INFLEX		Non-INFLEX	
		#	FDI covered	#	FDI covered
Afghanistan	0.00	2	6	0	0
Angola	0.03	1	0	3	450
Bangladesh	0.01	9	1108	12	2462
Benin	0.00	3	77	4	-0
Burkina Faso	0.00	7	0	4	1994
Burundi	0.01	2	1	3	234
Cambodia	0.04	9	0	5	0
Central African Republic	0.00	0	0	2	0
Chad	0.01	0	0	3	0
Comoros	0.04	1	0	1	0
D. R. Congo	0.13	1	0	4	0
Djibouti	0.00	1	0	1	0
East Timor	-	0	0	0	0
Eritrea	0.00	0	0	1	0
Ethiopia	0.10	14	822	7	386
Gambia	0.00	2	0	4	1
Guinea	0.03	2	0	4	9
Guinea-Bissau	nan	0	0	0	0
Haiti	0.12	1	-1	2	4
Kiribati	0.01	0	0	0	0
Laos	0.05	11	554	7	386
Lesotho	0.00	2	0	1	0
Liberia	0.02	0	0	3	0
Madagascar	0.72	1	-8	6	211
Malawi	0.02	1	20	2	0
Mali	0.00	3	0	5	1162
Mauritania	0.00	3	0	5	358
Mozambique	0.05	3	2293	10	370
Myanmar	0.07	3	0	4	4518
Nepal	0.01	1	26	2	0
Niger	0.01	0	0	2	0
Rwanda	0.01	0	0	5	23
Senegal	0.01	5	0	12	2633
Sierra Leone	0.01	1	23	1	0
Solomon Islands	0.10	0	0	0	0
Somalia	0.02	0	0	2	1
South Sudan	0.01	0	0	0	0
Sudan	0.01	4	0	5	0
São Tomé and Príncipe	-	0	0	0	0
Togo	0.00	1	0	2	0
Tuvalu	0.00	0	0	0	0
Uganda	0.03	3	3226	3	89
Tanzania	0.28	5	526	5	300
Yemen	0.02	10	1	5	198
Zambia	0.02	2	136	3	151

FDI positions in millions of current 2021 USD.

Table 9 lists the 17 mega-diverse countries, their EXT values, and the number of inflexible and non-inflexible agreements to which they are parties to, and the respective levels of aggregate FDI positions covered by these agreements. Importantly, the top eight countries in the table are also included in the group of most threatened countries. Our approach therefore seems quite vindicated in this regard.

Observation 10 *Eight of the 12 most threatened countries are also megadiverse, namely: China, Colombia, Malaysia, Mexico, Philippines, Papua New Guinea, Peru and South Africa.*

Second, the classification of countries as megadiverse is also of interest to this study since it can point to countries that we have failed to include in our most problematic country classification. Even if there is currently no threat to their biodiversity according to the EXT measure, it should be of concern if these countries are bound by inflexible agreements, in particular if they have have significant inward investments that are protected by these agreements. There are indeed megadiverse countries that have not been classified as problematic:

Observation 11 *Nine megadiverse countries are not included in the group of most threatened countries:*
- Brazil and Ecuador do not have any inflexible agreements; and
- Australia, D.R. Congo, India, Indonesia, Madagascar, United States and Venezuela have less than USD 2 billion of inward FDI positions that are protected by inflexible agreements.

These countries have somewhat higher EXT values on average than the most threatened countries (.63 compared to .50) in Table 9. But they have (by construction) much smaller, or no, inward positions that are protected by inflexible agreements. So to the extent that we trust the indicators, they should be of less concern.

This picture is strengthened by the observation that countries that have not been included among the most threatened countries also have much smaller inward FDI positions that are protected by agreements that have not been classified as inflexible. This is a further reassurance in light of the stringent criteria we have used for the inflexible classification.

Table 9: The megadiverse countries

Host	EXT	INFLEX #	INFLEX FDI covered	Non-INFLEX #	Non-INFLEX FDI covered	Most Threatened
Mexico	1.00	6	73260	23	104826	Yes
Colombia	0.92	1	10700	7	8272	Yes
China	0.57	44	308064	41	226434	Yes
Peru	0.49	17	10540	9	16978	Yes
Philippines	0.39	19	11717	8	5375	Yes
Papua New Guinea	0.25	3	18234	2	10	Yes
Malaysia	0.23	19	15631	19	27988	Yes
South Africa	0.20	11	2499	0	0	Yes
Indonesia	1.00	17	480	2	12962	No
Brazil	0.98	0	0	2	5109	No
Ecuador	0.82	0	0	0	0	No
Madagascar	0.72	1	-8	6	210	No
India	0.57	3	0	4	13	No
Australia	0.52	13	27	0	0	No
United States	0.49	1	1963	38	8768	No
Venezuela	0.42	5	0	19	8166	No
D.R. Congo'	0.13	1	0	4	0	No

FDI is reported in millions of current 2021 USD.

5.3 The most problematic agreements

In the previous section we identified the host countries for which the investment regime seems to pose the most severe threat to biodiversity. We now turn to our second main issue: Which *agreements* seem to be most problematic?

The most threatened countries were identified on the basis of their aggregate FDI positions, but these positions can be protected by many agreements. Individual agreement might protect smaller FDI positions, and should therefore presumably not qualify as being most problematic. We will instead look for individual inflexible agreements that protect large FDI positions, this being the natural approach if we want to identify the most desirable targets for redrafting or termination.

Each bilateral treaty protects investments in two directions, and the two parties involved typically have different biodiversity vulnerability. Each treaty can be characterized as a pair of observations, with one observation capturing the investments from one party into the other, and a second capturing the investments in the other direction. That is, an inflexible treaty between country i and country j will be characterized by the two pairs (EXT_i, FDI_{ji}) and (EXT_j, FDI_{ij}), where FDI_{ij} is the FDI position the country i has

in country j, and conversely for FDI_{ji}. Our data set comprises 995 inflexible agreements, which means there are 1 990 bi-directional investment relationships between the parties to each inflexible agreement.

Figure 4 plots the host country EXT value and the inward FDI position covered for each inflexlible agreement. Each of the 995 agreements are plotted twice since each party is a host.

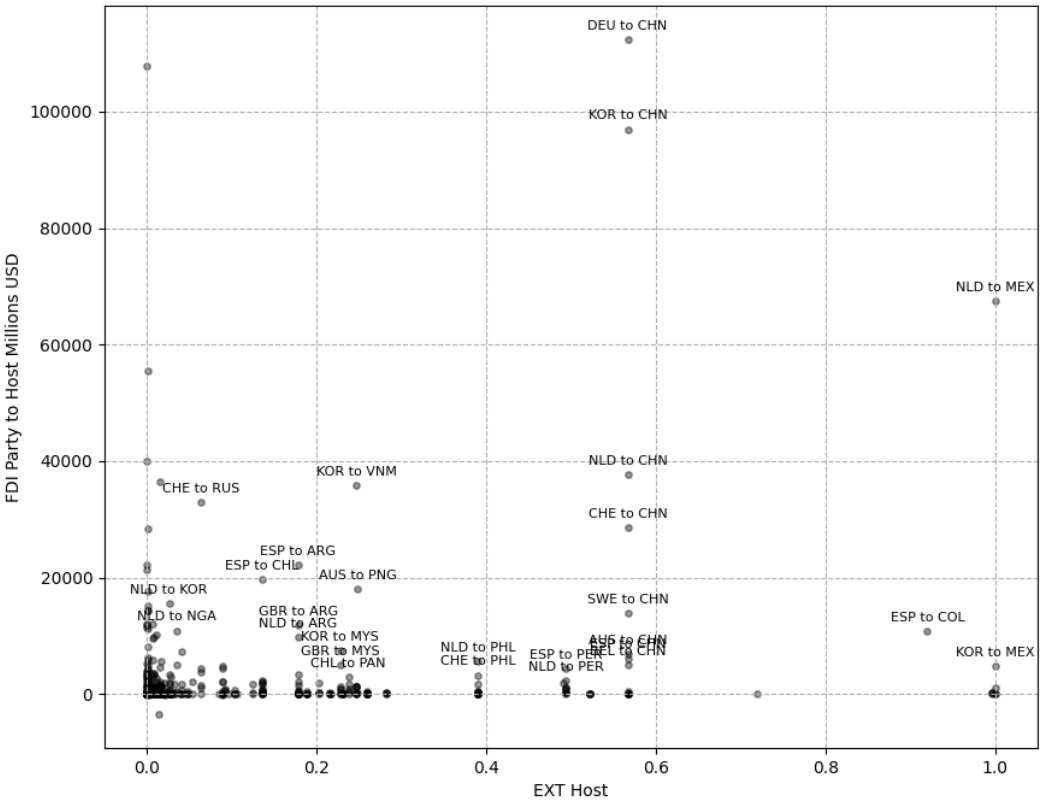

Figure 4: FDI positions per inflexible agreement versus host country EXT

Most of the observations are for EXT values smaller than .10 and/or smaller investment positions. These agreements should not be of primary concern from a biodiversity point of view. To direct attention to the agreements that seem more problematic, we will use the following definition:

Definition 4 *The "most problematic agreements" are the inflexible agreements protect-*

ing FDI positions exceeding USD 1 billion in countries with EXT $\geq .10$.[27]

Table 10 lists the 44 agreements that are most problematic according to this definition. It states the host country to the FDI positions, the EXT values, the source countries for the investments, and the magnitude of the positions.

An immediate observation from the table is that all 12 threatened countries are also host countries parties to some of the 44 most problematic agreements. Conversely, the only countries parties to the most problematic agreement(s), that are not classified as most threatened countries, are Costa Rica and the United States. The reason for the latter is that their aggregate inward FDI positions covered by inflexible agreements are smaller than USD 5 billion but larger than the USD 1 billion cutoff applied here.

The table also identifies the two agreements that protects the largest FDI positions, namely: the China-Germany agreement, which protects an FDI position in China of USD 112 billion; and the China-South Korea agreement, which protects and FDI position in China of USD 97 billion. These two treaties account for 37 percent of the total FDI positions covered by the most problematic treaties.

Another striking feature of the table is the dominance by China. It is does not dominate so much in terms of the number of most problematic agreements—it is party to seven of the 44 the agreements. However, China accounts for 54 percent of the combined FDI positions that are protected by these 44 most problematic agreements, compared to Mexico's 13 percent, which is second largest.

Observation 12 *All 12 of the most threatened countries are parties to the 44 most problematic agreements, and 42 out of 44 problematic agreements have threatened countries as hosts.*

[27]The definition allows both parties to an agreement may be 'problematic, but given the OECD investment data, there are only a few such instances.

Table 10: The most problematic agreements

Host	Host EXT	Source	Inward FDI position covered
Mexico	1.0	Netherlands	67414
		South Korea	4709
		Denmark	1029
Colombia	0.92	Spain	10700
China	0.57	Germany	112418
		South Korea	96983
		Netherlands	37643
		Switzerland	28495
		Sweden	13878
		Australia	6777
		Spain	6132
		Bleu Belg	5006
Peru	0.49	Spain	4308
		Netherlands	2331
		Germany	1024
		United Kingdom	1018
United States	0.49	Czech Republic	1963
Philippines	0.39	Netherlands	5615
		Switzerland	3220
		Germany	1636
Papua New Guinea	0.25	Australia	18012
Vietnam	0.25	South Korea	35910
		Germany	1358
		United Kingdom	1279
		Switzerland	1267
		Italy	1228
Panama	0.24	Chile	2982
		Germany	1697
Malaysia	0.23	South Korea	7491
		United Kingdom	4907
		Denmark	1324
South Africa	0.2	Sweden	1856
Argentina	0.18	Spain	22110
		United Kingdom	11739
		Netherlands	9697
		Switzerland	3318
		Germany	2163
		Mexico	1574
Chile	0.14	Spain	19696
		Sweden	2383
		Germany	2120
		United Kingdom	1955
		Switzerland	1748
Costa Rica	0.12	Switzerland	1622
		Total:	571735

Note: FDI is reported in millions of current 2021 USD.

Table 11: Source countries for the most problematic agreements

Country	# INFLEX	Outward FDI position covered
South Korea	4	145093
Netherlands	5	122700
Germany	7	122416
Spain	5	62946
Switzerland	6	39670
Australia	2	24790
United Kingdom	5	20898
Sweden	3	18117
BLEU	1	5006
Chile	1	2982
Denmark	2	2353
Czech Rep.	1	1963
Mexico	1	1574
Italy	1	1228
	Total:	571735

Note: Positions are aggregate outward FDI positions protected by the most problematic agreements in millions of current 2021 USD.

5.4 The source countries

We have thus far focused on the host countries. But we are also interested in characterizing the source countries to the most problematic agreements. These countries are identified in Table 11, which aggregates the data in Table 10 for each source country. It shows that the outward positions for the problematic agreements are highly concentrated to a few countries, and that European countries dominate the list:

Observation 13 *Three source countries jointly stand for two-thirds of the FDI positions protected by the most problematic agreements:*
- South Korea accounts for 25 percent;
- Germany and Netherlands stand for 21 percent each; and
- European countries jointly stand for 70 percent.

We will return to this in the concluding discussion.

6 Concluding discussion

We conclude by first summarizing the main findings, then draw some more general policy conclusions, and end by pointing to some issues for future research.

6.1 Main takeaways from the findings

Our aim was to identify the agreements and countries where the investment protection regime poses the most severe threat to biodiversity. In section 5.1 we identified the most biodiversity threatened host countries based on the aggregate volumes of inward investment covered by inflexible agreements, and their EXT values. In Section 5.2 we brought a number of additional factors that might affect the threat from investment treaties, partly to complement the analysis in the previous section, and partly as a robustness check. In Section 5.3 we pointed to the problematic inflexible agreements, based on the investment volumes the agreements cover, as well as the EXT values for the respective host countries. What conclusion can be drawn from all this?

First, a general conclusion that emerges is that a large fraction of agreements are drafted in a way that has enabled arbitration panels to interpret the agreements in a way that imposes strict compensation requirements on host countries. Investment treaties must therefore be reckoned with:

Takeaway 1: *The large number of agreements that are in force, and the large fraction of these that fulfil the strict requirements for qualifying as inflexible, suggest that the investment protection regime can potentially impose a serious threat to regulatory policies in general.*

Second, the threat from the investment protection regime to biodiversity is not primarily directed at the most developed countries:

Takeaway 2: *Developed countries heavily dominate with regard to the number of agreements, and the number of inflexible agreements, to which they are parties. However, their biodiversity-sensitivity, as measured by the EXT indicator, is for the most part low enough to exclude them from the list of the most threatened countries.*

Third, nor are the least developed countries the main targets for the treat from the investment protection regime:

Takeaway 3: *Among the 45 LDC, investment treaties seem to mainly threaten Bangladesh, Ethiopia, Mozambique, and Uganda.*

Fourth, the biodiversity in middle-income countries are the most threatened:

Takeaway 4: *The threat appears to be most acute for 12 mostly middle-income countries that have EXT values exceeding .10, and aggregate inward FDI positions exceeding USD*

2 billion that are protected by inflexible agreements, namely: Argentina, Chile, China, Colombia, Malaysia, Mexico, Papua New Guinea, Panama, Peru, Philippines, South Africa and Vietnam.

Fifth, the identification of these 12 countries as most problematic is largely supported by our examination of other factors that might affect the threat from investment treaties:

Takeaway 5: *The countries that have been identified as most threatened:*
- are also often parties to many inflexible agreements;
- are also often parties to many non-inflexible agreements;
- often have higher inward FDI-to-government revenue ratios; and
- are also often mega-diverse.

Sixth, one country stands out as being of particular concern:

Takeaway 6: *China dominates heavily with:*
- the eight highest EXT score;
- by far largest aggregate inward FDI position that is protected by inflexible agreements;
- the largest number of inflexible agreements;
- the largest number of non-inflexible agreements.

6.2 Policy implications

We have identified the countries where biodiversity seems to be most threatened by the investment treaties they are parties to. We have also identified the agreements that seem to pose the main threat. From a biodiversity perspective, it would thus be desirable if these identified agreements were renegotiated, or ceased to apply. Redrafting or termination of a small fraction of the 995 inflexible agreements would significantly reduce the threat posed to biodiversity by the international investment regime:

Policy conclusion 1: *A redrafting of under three percent of the inflexible agreements—the 44 agreements that we have identified as most problematic—could remove USD 572 billion of the inward investment positions currently protected by inflexible agreements.*[28]

[28] As stated above, there are 995 inflexible agreements in total, covering USD 1 346 billion of investment that is covered by inflexible agreements, USD 572 billion of which is covered by the 44 most problematic agreements.

There are several hurdles for such a process, however. First, the agreements cannot be revised or terminated unilaterally, due to the sunset clauses the agreements almost invariably include (see Appendix A). Jointly agreed renegotiation or termination will be required for an existing agreement to be replaced or cease to apply with immediate effect.[29] This requires cooperation by source countries, however, since both parties to a bilateral agreement must agree to its renegotiation.

In Europe, the EU should back renegotiation of existing inflexible agreements, judging by its position with regard to biodiversity. The EU has been at the forefront of the multilateral efforts to protect biodiversity. The Commission actively backed the multilateral negotiations leading up to the Kunming-Montreal Global Biodiversity Framework, and it has stated that it expects to lead the implementation of these commitments.[30] In June of 2023, the EU Regulation on Deforestation-free products entered into force and will affect EU imports that are deemed to have an adverse biodiversity impact.[31]

In late 2022, the EU announced that it would join the Accelerator Partnership to support the future implementation of the Global Biodiversity Framework and will also support the creation of a Global Knowledge Support Service for Biodiversity. Furthermore, as described in Appendix A, the Commission has been one of the leading forces behind the modernization of investment treaties. One should thus expect that the Commission would push for reforms of the agreements that are problematic from a biodiversity perspective. Several large European countries have taken similar positions in the debate.

However, European countries do not appear to make any efforts to revise their inflexible agreements with countries with vulnerable biodiversity. It is thus hard to escape the following conclusion:

Policy conclusion 2: *There is a tension, or at least a lack of coherence between the EU Commission's, and some Member States', stated ambitions regarding biodiversity protection and the actual policies of European countries.*

This state of affairs is even more noteworthy in light of the fact that the above-

[29] According to one legal view, agreements endow investors with rights that cannot be withdrawn through the termination of agreements. The more dominant view appears to be that the parties are effectively the masters of their agreements, and can revoke any protection that the agreements stipulate, including in sunset clauses. Joint termination requires that both parties consent to termination, which might be harder to achieve for a country that seeks to escape an agreement than unilaterally withdrawing from the agreement.

[30] For information on EU's biodiversity strategy, see `https://environment.ec.europa.eu/strategy/biodiversity-strategy-2030_en`.

[31] For information on the EU's timber regulation, see EU 2023/1115 Regulation on Deforestation-free products at `https://environment.ec.europa.eu`.

mentioned outward FDI positions constitute a very small part of the total outward positions of European countries. For instance, EU members' FDI positions covered by inflexible agreements with countries with EXT $\geq .10$ amounts to a total of around USD 350 billion, or roughly five percent of the total outward FDI positions of these countries.

A second hurdle for a revision of the investment protection regime is that even if source countries, which normally have most to lose from renegotiations, were to agree to renegotiations of their agreements, the process would take considerable time and require legal and administrative resources. It is hence unlikely that countries that are parties to a large number of agreements will be able to renegotiate them all at the same time, even if desiring to do so. However, with the limited resources available in mind, our study points to the agreements that should prioritized: the 44 agreements that we have identified as most problematic.

Policy conclusion 3: *Renegotiation of the 44 problematic agreements would concern only a very small proportion of all EU outward investment positions.*

6.3 Implications for future work

There are several limitations of this study that preclude the drawing of a more complete picture of where the investment protection regime poses the main threat to biodiversity.

(1) Our data set comprises large number of agreements—1 781 bilateral treaties—which have been used to identify 995 agreements with particularly problematic drafting. However, we have not been able to fully examine the relationship between countries within this set of agreements due to a shortage of systematic data on investment positions. We have been confined to observations in OECD data, which only contain information on investments involving an OECD country as a source and/or host country. This implies that we do not include 304 bilateral agreements between non-OECD countries. Most of these agreements are likely to cover only small investment positions, however, so omitting them should not have any significant impact on the results. There is one very serious omission, however: *Chinese outward positions are not included.* China and Chinese firms have made very large investments in a large number of countries, including countries that rank high in terms of EXT values. Furthermore, China has agreements containing investment protection with all of the other most threatened countries, except for Panama, and China has a large number of agreements with other countries.

(2) There are some 440 bilateral investment agreements in force that have not been included in the study, since they have not been mapped in the UNCTAD-led project. These agreements tend to be more recent, and may therefore have been drafted in a less inflexible fashion, even though we have not seen any systematic evidence of this. It would be highly desirable to include these agreements for the sake of completeness.

(3) Our data only include bilateral investment treaties. As mentioned, there are several hundred agreements that include investment protection that we do not cover, according to the UNCTAD database. In particular, there are some major trade and investment agreements that include significant investment protection. Our guess is however, that the more recent among these will not qualify as inflexible, for instance due to the inclusion of exception clauses. We excluded this category of treaties from this study since most of them have not been mapped in the UNCTAD-led project.

(4) The study has been based on country-level investment data. However, it is clear that the threat to biodiversity differs substantially across industries, with industries such as agriculture, extraction of natural resources, and forestry being more harmful to biodiversity than other industries. It would therefore be highly desirable to break down the analysis to an industry-level. Biodiversity is location specific. Activities that are harmful in one location may not be harmful in another location. It would therefore also be highly desirable to study location specific aspects as well.

A Basic features of investment treaties

Investment agreements were initially formed as bilateral treaties between developed and developing countries to protect and encourage developed country investments in developing countries. The first agreement was established in the late 1950s between Germany and Pakistan, and by the end of the 1970s around 170 agreements of this type had been formed. During this period, it was quite common that developing countries expropriated foreign assets or took other policy interventions with similar effects. The purpose of the agreements was to stimulate investments by credibly committing the developing countries to compensate foreign investors in case of expropriations, etc.

Over the years, the number of investment agreements has rapidly increased, and there are currently 2 610 in force worldwide, of which 2 222 are bilateral agreements.[32] The majority of the agreements have been formed after the mid-1990s. Today, approximately

[32]UNCTAD's International I Agreements Navigator `https://investmentpolicy.unctad.org/international-investment-agreements`, accessed 17 June 2024.

60 percent of the bilateral agreements are between developed and developing countries; 25 percent between developing countries, and the balance between developed countries. It has also become increasingly common for preferential trade agreements to include investments protection. An early example of this is the North American Free Trade Agreement (NAFTA) that went into force 1994.

A.1 The main components

Despite the very large number of investment agreements in force, most agreements have a remarkably similar structure. In what follows we give a brief overview of the standard components of what we will denote as "traditional" investments agreements, which includes most agreements that were formed before around 2015, which are the agreements that we will be mostly concerned with in this study. As will be explained in more detail below, the distinguishing feature of these agreements is that they include the standard obligations for host countries but give very little guidance to arbitration panels regarding how to interpret these obligations. These agreements are for the most part very short, often not longer than five pages.

Substantive provisions The core of investment agreements are the substantive rules that they impose on host countries; traditional agreements hardly ever impose any obligations on investors, and rarely on source countries.

A core substantive obligation is that host countries should provide *fair and equitable treatment*, which is included in almost all bilateral treaties in some form. Most traditional agreements do not contain any specification of the meaning of this amorphous concept. This has enabled some arbitration panels to make far-reaching interpretations of the obligations it imposes (see below). Claims regarding violations of fair and equitable treatment is the most frequent alleged violation in known disputes, and it is also the most found form of violation by arbitration panels (see below).

Another core obligation is to provide full protection and security, which is included in most agreements. Like the obligation to provide fair and equitable treatment, this provision serves to cover policy measures that are not covered by the agreements' more specific substantive obligations. Again, traditional agreements typically do not provide any further explanation of the concept. It has been interpreted to require host countries both to refrain from actively interfering with investments, and to actively protect investments and investors from harm by private parties.

Yet another central substantive provision is the protection against expropriation,

which can be found in the vast majority of agreements. This provision typically forbids *direct expropriation*, where the host country seizes an investor's assets. Most agreements also include *indirect (or regulatory) expropriation*, where a host country action has an effect equivalent to direct expropriation but does not involve outright takeover of assets, unless such measures are taken in the public interest and under due process of law, the measures are discriminatory, and combined with prompt, adequate, and effective payment of compensation.

The agreements typically also include a range of other provisions, such as non-discrimination obligations, the right for investors to *transfer investments and proceeds, to have access to convertible currency, to freely move for management*, etc.

Constraints on the reach of substantive provisions Most traditional investment agreements include few, if any, restrictions on the reach of the above substantive provisions. But their reach can still be limited by the general "police powers doctrine" in international law. It holds that a state has an inherent right to regulate, as long as it takes measures that are genuinely (bona fide) in the public interest, are non-discriminatory, are proportional to the regulatory problem at hand, and are taken through due process. The status of this doctrine is debated in a large legal literature, however, and arbitration panels often find that the doctrine does not protect host countries from findings of indirect expropriation, or of failure to provide fair and equitable treatment.[33] Versions of the doctrine are sometimes found in clauses regarding host country rights to regulate.

There are restrictions on the reach of the substantive provisions in some pre-2015 agreements, although this is rare. When included, this could be in the form of e.g. definitions of central terms, exclusions of certain sectors from the applicability of the agreements, or as exceptions clauses. But as will be seen, some recent agreements include significantly more constraints of these forms.

Dispute settlement A vast majority of investment agreements provide for both ISDS and state-state dispute settlement (SSDS). SSDS is hardly ever used in practice, however, almost all known disputes have been brought by private investors.

That private parties can take foreign states to arbitration is a rarity in international law. For instance, it does not exist in pure trade agreements, where disputes can only occur between the government parties. When investments agreements allow for ISDS, they specify the international forum (or fora) that investors can use, the most common being the International Centre for Settlement of Investment Disputes (ICSID) under

[33]REF to be added, ALI Restatement?

the World Bank, or arbitration under the rules of the United Nations Commission on International Trade Law (UNCITRAL), the International Chamber of Commerce (ICC), or the Stockholm Chamber of Commerce (SCC).

The total number of disputes under investments agreements is unknown, as many agreements allow for confidential disputes. But the UNCTAD Dispute Settlement Navigator contains information regarding 1 332 disputes as of 17 June 2024, 958 of which have been concluded.[34] Among these, roughly half were either won by the host countries or discontinued. Almost the same share was won by investors, or were settled, which presumably involves some gains for investors.

Enforcement An important feature of the investment protection regime is the international conventions that support the enforcement of investment agreements, although formally not being part of the agreements. For instance, if a dispute is arbitrated under ICSID, all 154 Member States of ICSID are required to automatically recognize the award without reviewing it before national courts. As a result, investors can request courts in any ICSID Member State to seize assets belonging to an ICSID host country that does not comply with a ruling against it (although practical legal hurdles may exist against such executions). The United Nations Convention on the Recognition and Enforcement of Foreign Arbitral Awards (the "New York Convention") provides similar possibilities, although not as strong, for enforcing arbitral awards for disputes outside ICSID. Due to this form of "third-party enforcement" investments agreements have much more potent enforcement mechanisms than most other treaties, including trade agreements.

Termination Most agreements specify conditions for unilateral termination of the agreements. This typically requires advance notice of denunciation, normally 12 months. The agreements continue to apply also to investments made between announcement of denunciation and when it takes effect. Virtually all agreements also include "sunset clauses" that extend the whole agreements or parts thereof for investments that exist at the time of the denunciations for a specified period, normally between five and 20 years. However, the majority opinion among legal scholars appears to be that sunset clauses do not apply in case the parties to an agreement jointly decide to terminate it.

[34] https://investmentspolicy.unctad.org/investments-dispute-settlement.

A.2 The critique

A central critique is that the investment agreements may *dissuade host countries from undertaking policy measures that somehow are desirable*. This "regulatory chill" as it is referred to is typically caused by three features of the agreements:

- The possibility for arbitration panels to interpret the agreements as imposing far-reaching compensation obligations on host countries,
- The magnitude of arbitration and compensation costs that host countries may have to bear if losing disputes, and
- The strong enforcement mechanisms that support these agreements.

Despite its plausibility, it is not a trivial issue to identify "regulatory chill". First, it is conceptually unclear what it means more exactly. Just like most other contracts are meant to steer the parties away from certain actions or inactions, the purpose of investment agreements is to discourage host countries from undertaking certain actions with adverse impact on investors. Hence, the mere fact that host countries are dissuaded from taking certain measures they otherwise would take, does not by itself mean that the agreements perform poorly, it might indeed signal the opposite. Second, since the chill typically takes the form of inaction, it is hard to define a counterfactual outcome absent the agreement. There is therefore no systematic data collect to support this critique.

What is clear however, is that arbitration panels have sometimes interpreted investment agreements to impose far-reaching obligations on host countries. An infamous example is the report by the *Tecmed* panel, which with regard to its interpretation of the fair and equitable treatment standard stated as follows:

> ... The foreign investor expects the host State to act in a consistent manner, free from ambiguity and totally transparently in its relations with the foreign investor, so that it may know beforehand any and all rules and regulations that will govern its investments, as well as the goals of the relevant policies and administrative practices or directives... Any and all State actions conforming to such criteria should relate not only to the guidelines, directives or requirements issued, or the resolutions approved thereunder, but also to the goals underlying such regulations.[35]

This interpretation obviously puts extremely onerous demands on the host country. Several later panels adopted this reasoning, but panels have more recently tended to interpret

[35] *Tecnicas Medioambientales* TECMED S.A. vs. The United States, Case N. ARB (AF)/002, International Centre for Settlement of Investment Disputes, May 29, 2003.

investment agreements in a more host country-friendly fashion. It illustrates how traditional investments agreements can be read in very different ways.

Another feature of investment agreements that has been intensively criticized is the dispute settlement systems. Features that have been criticized include the following:

- There are very limited possibilities to appeal determinations by panels, which increases the likelihood of erroneous decisions.
- The confidentiality rules imply that governments might be involved in legal processes and forced to make large compensation payments without the knowledge of the general public.
- The lack of consistency in case law creates uncertainty about the actual obligations that agreements impose.[36]
- Investors can establish shell companies in countries with investor friendly investment agreements to use these agreements against third countries, known as "forum shopping."
- Investors can use MFN provisions to claim rights that host countries have committed to in separate agreements with third countries, known as "cherry picking."
- Third-party funding, where outside parties cover the process costs for private investors against receiving a share of any resulting compensation payments, leads to an excessive number of complaints.
- Two of three panelists are normally appointed by the parties. There are concerns that impartiality of panels is compromised, since these panelists sometimes have long-term commercial relationships with law firms representing clients and, therefore, may have personal interests in the dispute's outcome.
- There are often significant legal costs for host countries even if they win disputes. For instance, Australia won a dispute against Phillip Morris concerning plain packaging legislation for tobacco products. Australia claimed around ASD 23 million in compensation for legal costs, but was only awarded around ASD 11.5 million.[37]

[36] A recent illustration is Schmidl (2021) study of the reasoning by arbitration panels in 28 ECT disputes concerning largely the same type of government measures taken by Spain, Italy and Czechia. Schmidl (2021) finds that the panels used three distinct reasonings regarding the fair and equitable treatment provision, resulting in that some panels found a violation of this provision, while other panels came to the opposite conclusion.

[37] The arbitration report can be found at `http://pcacases.com/web/sendAttach/2190` and the

A.3 The recent policy response

During recent years there has been a tendency to revise the investment protection regime. First, some developing countries have terminated their investment agreements. Second, some existing agreements have been renegotiated including NAFTA and the Energy Charter Treaty. Third, some major new agreements have been drafted very differently compared to traditional agreements, a trend that has largely been driven by the EU. The purpose of these changes has been to limit the discretion of arbitration panels to interpret the agreements as imposing far-reaching obligations on host countries.

Changes have been made to both substantive undertakings and dispute settlement procedures. These new agreements, as well as the revised agreements, typically include a large number of specifications to the substantive obligations that are not found in traditional agreements. The agreements include more definitions of the central terms. They also include carve-outs regarding for instance host country rights to pursue non-discriminatory policies to protect human, animal and plant life and health, to promote sustainable developments, and uphold internationally recognized labor standards, etc.

These changes are often highly significant in a quantitative sense. For instance, the Dutch 2019 Model Bilateral Investment Treaty (BIT) contains more than four times as many words as the Dutch 1997 Model BIT. Most of the added text in the 2019 version serves to limit the reach of the agreement.

Redrafting of substantive provisions A main substantive provision to be concerned about from a biodiversity perspective is the one regarding fair and equitable treatment. An example of the typical drafting of the fair and equitable treatment provision in traditional agreements is provided by the agreement between Sweden and China from 1982, which states that "[e]ach Contracting State shall at all times ensure fair and equitable treatment to the investments by investors of the other Contracting State." This is *all* the agreement says about this provision.

As was seen in e.g. the above-mentioned Tecmed dispute, such formulations has been given far-reaching interpretations. This can be contrasted with Art. 10.8(1) in the Canada-European Union Comprehensive Economics and Trade Agreement (CETA), which also requests fair and equitable treatment, but also provides a list of measures that amount to breaches of this principle, including:

1. Denial of justice in criminal, civil or administrative proceedings;

cost specification at `aftinet.org.au`

2. Fundamental breach of due process, including a fundamental breach of transparency, in judicial and administrative proceedings;

3. Manifest arbitrariness;

4. Targeted discrimination on manifestly wrongful grounds, such as gender, race or religious belief;

5. Abusive treatment of investors, such as coercion, duress and harassment.

While there is some debate regarding whether this is a closed list, it directs the application to severely adverse treatment of the protected investments. There is an enormous difference in the ambit of the provision with this interpretation, and e.g. the above-cited interpretation by the *Tecmed* panel.

Another substantive provision that has been redrafted is the indirect expropriation clause. Traditional agreements typically do not provide any guidance regarding what defines such an expropriation. In contrast, Annex 8-A CETA restricts the reach of this provision as follows (with added emphasis):

> For greater certainty, except in the *rare circumstance* when the impact of a measure or series of measures is so severe in light of its purpose that it appears *manifestly excessive*, non-discriminatory measures of a Party that are designed and applied to protect legitimate public welfare objectives, such as health, safety and the environment, do not constitute indirect expropriations.

Introduction of carve-outs and exceptions Recent agreements also include various forms of carve-outs from the substantive obligations. For instance, Art. 8.9 CETA states:

1. For the purpose of this Chapter, the Parties reaffirm their right to regulate within their territories to achieve legitimate policy objectives, such as the protection of public health, safety, the environment or public morals, social or consumer protection or the promotion and protection of cultural diversity.

2. For greater certainty, the mere fact that a Party regulates, including through a modification to its laws, in a manner which negatively affects an investments or interferes with an investor's expectations, including its expectations of profits, does not amount to a breach of an obligation under this Section

Such reservations are often completely lacking in older agreements. Carve-outs can also exclude certain industries or policy areas from the protection of the agreements.

Reduced scope of the ISDS mechanism Another reform area is the ISDS mechanisms. For instance, the CETA dispute settlement mechanism has a standing dispute settlement tribunal, with randomly chosen judges from a pre-selected a pool. It is possible to appeal decisions to an appellate body. There is also a range of other procedural innovations, including measures to enhance the quality and independence of arbitration panels. And to dissuade frivolous disputes, CETA requests the losing party to pay both parties' litigation costs, in contrast to standard practice under traditional agreements. There are also a few recent agreements where countries have abstained completely from ISDS. For instance, Canada opted out of ISDS in the revised version of NAFTA.

B Reflections on the national Red List Index

The purpose of our study is to identify the investment agreements that appear to pose the largest potential threat to biodiversity. To this end we need to rank countries in terms of their biodiversity at risk. We will here briefly discuss the index and show how it correlates with the EXT indicator.

B.1 Why the Red List Index is less suitable here

The IUCN Red List data is used to compute national Red List Index (RLI) values. These are used e.g. by the UN to measure countries' progress towards meeting the Sustainable Development Goal 15, which is to:"[t]ake urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species".

The RLI is poorly designed for this purpose, however.[38]

The UN website defines the Red List Index value for country c at time t as follows:[39]

$$RLI_c \equiv 1 - \frac{\sum_s w_s h_{sc}}{\sum_s h_{sc}} \tag{B.1}$$

[38]Bubb et al. (2009) and Raimondo et al. (2022) point to a range of issues regarding national Red List indices.

[39]We infer that this is how the index is calculated based on the United Nations Statistics Division document "SDG indicator metadata" from 2023 (United Nations Statistical Division (2023) below), which provides metadata for the index that is used for Goal 15.5.1. According to this document, expression (B.1) gives national Red List Index values, and the document does not provide any other such expression. However, there is no explicit statement that this how the provided index values have been calculated.

where

$$h_{sc} = \frac{r_{sc}}{R_s} \tag{B.2}$$

and where r_{sc} is the range of species s in country c, and R_s is the global range size of species s.[40]. The term h_{sc} is hence the share of the global range of species s that roam in country c.[41] By construction the index ranges between 0 and 1.[42]

We see two issues with regard to the RLI for the purpose of our study.

Insensitivity to proportional changes in ranges Consider the following application of the Red List Index in equation (B.1) to a numerical example. Suppose the world consist of two countries, A and B, and two species with $w_1 = .2$ and $w_2 = .6$. Assume further that each country has half of the global range of each species: $h_{1A} = h_{2A} = h_{1B} = h_{2B} = .5$. The RLI for each country c will then be

$$RLI_c = 1 - \frac{.2 \times .5 + .6 \times .5}{.5 + .5} = .6 \tag{B.3}$$

Now consider an alternative scenario where the ranges for both species in country B are 80 percent of the global range: $h_{1A} = h_{2A} = .2, h_{1B} = h_{2B} = .8$. The RLI for country A is now:

$$RLI_A = 1 - \frac{.2 \times .2 + .6 \times .2}{.2 + .2} = .6 \tag{B.4}$$

and that for country B is:

$$RLI_B = 1 - \frac{.2 \times .8 + .6 \times .8}{.8 + .8} = .6 \tag{B.5}$$

Hence, despite the fact that the biodiversity problem is mainly located in country B, the RLI assigns the *same* value to the two countries. The difference in range in this example

[40]United Nations Statistical Division (2023) states that "r_{sc} is the fraction of the total range of species s in [country c]". We presume that the words "fraction of" are inserted by mistake, since it does not seem meaningful to divide a fraction, which is a number between 0 and 1, with the total range of a species, which is an area. Our interpretation is also supported by the definition given by Rodrigues et al. (2014)

[41]We write the formula slightly differently than how it appears in United Nations Statistical Division (2023), but the expressions are the same. To see why, note first that United Nations Statistical Division (2023) uses subscript u instead of c to denote the geographic unit. It also uses $W_{\{t,s\}}$ to denote the extinction risk at time t for species s, but we disregard the time index in the formula above. Furthermore, United Nations Statistical Division (2023) divides the expression in the numerator with the weight given to extinct species, W_{EX}, which is the maximum weight reflecting extinction risk, and which has been set to 5. In expression (B.1) we write this more conveniently as $w_s \equiv W_{t,s}/W_{EX}$.

[42]See Butchart et al. (2007) for a discussion of other problems with the Red List.

could e.g. reflect differences in country size. Smaller countries would, all else equal, bear a larger share of the biodiversity conservation burden. We can therefore not use it to assess the agreements countries are parties to in terms of the threat they pose to biodiversity. Nor can the index serve as a tool for allocating scarce resources for biodiversity protection across countries in an efficient manner.

The denominator confuses interpretation The second problem stems from the term $\sum_{s=1}^{N} R_{sc}$ in the denominator of the RLI Equation B.1. Since the summation in the numerator is over a large number of species, it can be practical to normalize it such that it falls between zero and one. The term $(\sum_{s=1}^{N} R_{sc})$ in the denominator is supposedly meant to serve this purpose. The problem is that this term can *change the rankings of countries* relative to how they would be ranked based on the numerator alone.

To illustrate, consider again the numerical example above, but modified such that the share of the global range for each species in Countries A and B are $h_{1A} = .4, h_{2A} = .3$ and $h_{1B} = h_{2B} = .3$. The numerator, $\sum_{s=1}^{N} w_{st} \times h_{sc}$, in the RLI Equation B.1, which should capture the responsibility of each country towards global species conservation when weighted with the severity of the threat to the various species, is then for country A:

$$.2 \times .4 + .6 \times .3 = .26 \tag{B.6}$$

while country B the same terms is

$$.2 \times .3 + .6 \times .3 = .24 \tag{B.7}$$

Country A will thus have a larger responsibility in the just mentioned sense. However, bringing in the denominator to the RLI computation changes the ranking:

$$RLI_A = 1 - \frac{.2 \times .4 + .6 \times .3}{.4 + .3} \approx .63 \tag{B.8}$$

and

$$RLI_B = 1 - \frac{.2 \times .3 + .6 \times .3}{.3 + .3} = .6 \tag{B.9}$$

That is, the RLI value is lower for country B. *The denominator of the expression for RLI hence also reverses the ranking of the countries.*

Unclear interpretation Yet another problem we have with the normalization is the interpretation of the resulting expression, when normalized this way. Since the normal-

ization changes the country ranking, the term affects the interpretation of the index. But we fail to understand what it actually captures.

Another problem we have with the RLI is that we find it hard to interpret. UNSD (2022), which provides background information regarding the country-level Red List Index on its website:

> The index varies from 1 if the country has contributed the minimum it can to the global RLI (i.e., if the numerator is 0 because all species in the country are Least Concern)...

Assuming that the summation is only over the species with positive ranges in country u, the index takes on the value 1 only if each species is classified as globally of "Least Concern".[43] It is not clear to us why this should be interpreted as saying that the country has "contributed the minimum". Indeed, as we understand it, there can be a loss of biodiversity in some countries, without this affecting the global "least concerned" classification.

United Nations Statistical Division (2023) refers to Rodrigues et al. (2014) regarding the interpretation of expression (B.1). The article interprets the term $\sum_{s=1}^{N} R_{sc}$, which appears in the denominator of the expression, as measuring "the responsibility of each country towards global species conservation." According to this interpretation, the term $\sum_{s=1}^{N} w_{st} \times R_{sc}$ should capture the responsibility of each country towards global species conservation, weighted with the severity of the threat to the various species. This is an abstract notion, but it has some intuitive appeal.

The problem we have with the interpretation of the RLI mainly stems from the term in the denominator. The technical role of the term is to scale down the numerator. Since the summation in the numerator is over a large number of species, it can be practical to normalize it such that it falls between 0 and 1. The term $\sum_{s=1}^{N} R_{sc}$ in the denominator of achieves this. However, this is not just a normalization, it also changes the interpretation of the index, which with the normalization becomes: the responsibility of country c towards global species conservation when weighted with the severity of the threat to the various species, *relative to the responsibility of country c towards global species conservation.* We find it hard to see what this captures, and it does not seem to capture what we are looking for.

[43] United Nations Statistical Division (2023) does not specify the set of species that the summations are taken over.

B.2 The relation between the EXT and RLI indices

The EXT and the RLI indicators for the threat to biodiversity only differ with regard to the denominator—the term that normalizes the index values to fall between 0 and 1. Indeed, they are formally closely related. Disregarding the period subscript:

$$EXT_c = k_c(1 - RLI_c), \tag{B.10}$$

where

$$k_c = \frac{\sum_s w_s r_{sc}}{\max_c \{\sum_s w_s r_{sc}\}}. \tag{B.11}$$

Hence, the parameter k_c is always less than unity. This implies that $EXT_c \leq 1 - RLI_c$ by construction. More importantly, the parameter k_c is *country-specific*, implying that that there will not be a perfect correlation between the two indices.

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