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Green and Sustainable Taxonomies: Dimensions, challenges and difficulties

Pablo G. Bortz*

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Summary

Since its inception in 2007, the sustainable bond market has grown exponentially. The flow of new investments and the risks to financial stability posed by climate change require risk-assessment methodologies and standards aligned with environmental and social goals, which led to the development of green, social and sustainable taxonomies. The number of green taxonomies has multiplied in recent years, through supranational, national and private initiatives. This paper presents a review of the topics that arise due to the proliferation of green and sustainable taxonomies. Among these topics, the paper focuses on financial, sectoral and international impacts. It discusses a potential "green spaghetti-bowl" effect given by the proliferation of green taxonomies, the calls for interoperability and the problem of arbitrage, and the hierarchy of taxonomies that renders some unsuccessful as they seek to mobilize private finance. I discuss as well the sectoral implications of different taxonomies, different environmental metrics, and the (lack of) adoption of transition criteria. I then look at the financial implications of taxonomies: potential stranded assets, credit flows, and the link between taxonomies, ESG ratings and the danger of greenwashing. Finally, I survey the international dimension impact, in terms of trade and financial flows, and trade agreements

Keywords: Sustainable Taxonomies, Financial Stability, Structural Change, ESG, Trade Agreements

JEL Classification: Q56, Q58, Q51.

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1. INTRODUCTION

Since the issuance of the first green bond in 2007 by the European Investment Bank (EIB), the sustainable bond market has grown exponentially, particularly after the 2015 Paris Agreement. It surpassed the USD 1 trillion new yearly issuance in 2021, and the USD 4 trillion mark of accumulated issuance in 2023 (CBI 2024a). The sustainable bond market is composed of different types of labelled bonds, according to their stated objectives and goals (Beteta Vejarano and Swinkels 2024). Among these bonds, green bonds dedicate their proceeds to the pursue of environmental goals, and comprise over 60% of the cumulative issuance of sustainable bonds until 2023, the last data available at the moment of writing this article (CBI 2024a). The other major labeled bond groups are social bonds, sustainability bonds and sustainability-linked bonds (CBI 2024a), which constitute the Green, Social and Sustainable (GSS+) bond universe. Green is not the only color used to label bonds.

The flow of investments, the potential impact on financial stability and the need to ascertain the greenness or sustainable nature of these investments call for the development and adoption of methodologies and standards for climate risks measurement and a record of activities and investment aligned (or not aligned) with the achievement of climate and social goals. In response to this need, in the last decade there has been a global proliferation of green and/or sustainable taxonomies, either by private or public institutions, by national or supranational bodies. Initially developed by private actors in the early 2010s, it did not take too long for public bodies to start developing and implementing their own taxonomies for their own financial systems. The numbers of public green and sustainable taxonomies grew significantly, both in developed and developing countries. At the time of writing this paper, there are numerous countries that have already issued or are in the process of designing their own taxonomies (CCAP and GIZ 2022, Alarcon and Miranda 2023, Natixis 2023, Fitch 2023).

This proliferation of taxonomies, at the international, supranational and national level raises several questions, challenges and problems. Some of these challenges relate to the design, adoption, implementation and updating of taxonomies themselves, and their effects across multiple sectors in the economy. Effects can go beyond pure financial considerations, and involve productive, distributive, regional and environmental dimensions. Other challenges have to do with the interactions and interrelations between *different* taxonomies, therefore creating tensions across different economies, in terms of balance-of-payments flows, and stocks of assets and liabilities, again with productive, distributive, geographical and environmental considerations. There is also a question about the coexistence of public and private taxonomies, some of which were designed and adopted by rating agencies for grading firms' environmental, social and governance (ESG) alignment, sometimes with significant disagreement between the agencies (Berg, Koelbel and Rigobon 2022).

Some of these challenges have already been brought up in several guides about how to develop a national taxonomy. Among these guides one can mention World Bank (2020), OECD (2020), CCAP and GIZ (2022) UNEP (2023) and SBFN (2023). The inclusion of multiple stakeholders, the need for updating the taxonomy, and the importance of domestic

contexts and characteristics are important common denominators in these guides. UNEP (2023) goes a step beyond and explores the implications of different taxonomies in Latin America for mobilizing finance for climate investment purposes. There are also recent works such as GIZ (2023) and Hilbrisch et al (2023) that take stock of the experiences with green or sustainable taxonomies in developing countries, such as Mexico and South Africa.

While taxonomies have been developed around the world to help clarify the potential environmental or social impact of portfolio decisions for investors and credit policies for banks, multilateral development institutions have also adopted criteria for their lending policies taking into consideration climate objectives for mitigation and adaptation. A group of Multilateral Development Banks (MDBs) has established the "Common Principles for Climate Mitigation Finance Tracking" and "Common Principles for Climate Adaptation Finance Tracking", a list of criteria and activities which are considered for climate financing. These principles were established in 2015 and updated in 2023. For the Joint Climate Finance Tracking Group of MDBs, this list of activities is exclusive, in the sense that projects that do not comply with the activities and criteria are excluded from lending for environmental objectives.

However, this article will focus on private financial markets, looking both at capital markets and banking regulations. The structure of this article is as follows. After this introduction, section two reviews the definitions and origins of sustainable bond markets and taxonomies, presents their different uses (for investment and regulatory purposes) and users, their objectives, and the different labels of sustainable finance instruments. Section three analyses the differences between the two big groups of taxonomies, i.e. binary versus "traffic light" taxonomies, and the debate about their inclusion (or not) of "scope 3" emissions, i.e. GHG emissions along the whole supply chain, and outside the control of a specific firm. Section four discusses problems arising because of the proliferation of green taxonomies, focusing on a type of "spaghetti bowl" effect, the tradeoff between interoperability and arbitrage between taxonomies, and the *de facto* development of a "hierarchy" between taxonomies. Section five analyses the differentiated sectoral impact of taxonomies according to their objectives, their sectoral coverages, whether they are bound to "science-based criteria" and their inclusion (or not) of transition considerations. Section six reviews multiple financial implications of green taxonomies, such as changes in credit flows and dangers to financial stability, the potential problem of stranded assets, financial regulatory implications, the risks of greenwashing (particularly in sustainability-linked bonds), and (the lack of) eventual premia for green financial products, called "greenium". Finally, section seven presents the open economy implications, focusing again on "scope 3" emissions and global value chains, environmental clauses in trade agreements and their effect on trade flows, FDI and portfolio (debt) flows.

2. DEFINITIONS, ORIGINS, LABELS, OBJECTIVES AND USERS

The sustainable finance landscape, of which green bonds are a significant part, includes several definitions, objectives and users. Different definitions and objectives lead

to the existence of several “labels” to identify the stated objective of specific bonds. Definitions may overlap, and in some cases leave the room open for interpretation and context-specific considerations (IPCC 2021: 1552). In its website, the EU defines sustainable finance as “the process of taking **environmental, social and governance (ESG) considerations** into account when making investment decisions in the financial sector, leading to more long-term investments in sustainable economic activities and projects” (EC 2024). Climate finance, in turn, is defined by the IPCC as finance “whose expected effect is to reduce net GHG emissions and/or enhance resilience to the impacts of climate variability and projected climate change” (IPCC 2021: 1552).If we focus on fixed-income securities, the pursue of environmental objectives is the characteristic of “green bonds”, as stated for instance by the International Capital Market Association (ICMA 2021: 4-5)[1]. There are also bonds that support social objectives and are therefore labeled “social bonds”. When a bond supports both green and social objectives, it is called “sustainable”. “Sustainability-Linked Bonds” (SLBs), in turn, do not support specific projects or activities, but rather *firms* or entities that contribute to sustainability. Finally, there is a rather controversial category called “transition bonds”, which covers projects with alleged positive environmental impact but in sectors which do not typically qualify as “green”, like oil & gas, cement, steel, and other “hard-to-abate” sectors. ICMA has refused to recognize a separate “transition bond” label, for instance. Controversies arise because of the lack of a commonly agreed definition of what “transition” is, which has stalled the development of the transition bond market. Green, Social, Sustainable and Sustainability-Linked bonds constitute the GSS+ bond market.

Focusing on green bonds, there are several types of them. There are “Use of proceeds” bonds, in which proceeds are earmarked for green projects; there are green bonds that refinance green projects; there are asset-backed or securitized green bonds; there are covered bonds (which finance certain projects out of a covered pool). Each type of bond has a different debt recourse or payment source. Even in terms of objectives, there have been developments of several “subspecies” of GSS+ bonds, not all of which have yet been assigned a color. Regarding subspecies of green bonds, one can find: Conservation bonds, biodiversity bonds, “blue bonds” (for marine and oceanic life conservation), etc. Similar things have happened with social and sustainable bonds in terms of objectives: “Pink bonds” (with gender-related objectives”), pandemic bonds, catastrophe bonds (on these, see McElvain 2024) and the like.

In cumulative terms, green bonds comprise over 63% of total GSS+-aligned bonds (CBI 2024a). In 2023, that proportion reached 67%. The GSS+ bond market has experienced similar upswings to global bond markets. Volumes issued in 2023 were 3% greater than in 2022, but are still 13% below the 2021 peak, particularly because of a decrease in social and sustainable bond issuance. For a while, Climate Bond Initiative (CBI)

[1] Green bonds, according to ICMA, include (but are not limited to) the following categories or objectives: renewable energy, energy efficiency, pollution prevention and control, management of living natural resources and land use, terrestrial and aquatic biodiversity, clean transportation, sustainable water and wastewater management, climate change adaptation, circular economy and green buildings.

provided coverage of transition bonds as well (see for instance CBI 2023). The first “transition bond” was issued by Repsol in 2017. In 2022, almost the entire transition bond market was concentrated in Japan.

While the first green bond was issued in 2007, the now standard process for green bond issuance was initially developed by the World Bank, and later adopted by the financial community (World Bank 2019). The process includes a second opinion about the “greenness” of the project to be financed, and the requirement for impact reporting. The growth of the green bond market, however, called for the design, development and adoption of methodologies, standards and criteria with which to assess the alignment of projects and activities with environmental goals. The first global initiative with that purpose was the CBI taxonomy, created in 2012. In 2014, a consortium of global banks issued the Green Bond Principles (GBP), which are now hosted by ICMA. Afterwards, several countries started to develop and implement their own taxonomy, as in the case of China (2015), France (2015), Japan (2017), Bangladesh (2017), Mongolia (2019), the European Union (2020), Mexico (2022), among others.

There are several, aligned definitions of what a green/sustainable taxonomy is. ICMA defines a taxonomy as “a classification system identifying activities, assets, and/or project categories that deliver on key climate, green, social or sustainable objectives with reference to identified thresholds and/or targets.” (ICMA 2020: 5). The Network for the Greening of the Financial Sector (NGFS) defines green taxonomies as “classification systems that define criteria to identify assets, projects and activities with environmental benefits or costs. They provide a basis for evaluating whether and to what extent an activity underlying a financial asset supports or hinders given environmental goals” (NGFS 2022: 11). Ehlers, Gao and Packer define sustainable taxonomies as “a set of criteria that provide the basis for an evaluation of whether and to what extent a financial asset will support given sustainability goals. Its purpose is to provide a strong signal to investors, and other stakeholders, and assist their decision making – by identifying the type of information needed to assess the sustainability benefits of an asset and to classify an asset based on its support for given sustainability goals.” (Ehlers, Gao and Packer 2021: 1).

While green bonds are a feature of capital markets, and initial taxonomies applied to capital markets, environmental goals can also be pursued and considered by the banking system. In fact, climate change poses substantial risks to financial stability (BIS 2021). Therefore, a taxonomy is also useful for banking activities. In 2015, the Financial Stability Board (FSB) established the Task Force on Climate-related Financial Disclosures (TCFD), with the goal of designing recommendations for firms to disclose to investors, lenders and insurers regarding climate risks and opportunities, according to the TCFD website. Those recommendations were issued in 2017, and are aligned with a major international taxonomy, the International Financial Reporting Standard (IFRS) Taxonomy, issued in 2023. Several central banks and banking regulatory bodies have affirmed their intention of applying the IFRS taxonomy to the monitoring and supervision of the banking and financial system under their jurisdiction. Finally, the BIS has included climate-related financial risks in its Core Principles for effective banking supervision (BIS 2024) as a requirement for scenario

analysis and stress testing exercises (BIS 2024: 1). Therefore, taxonomies are not just useful for capital market investors, but also serve financial regulatory purposes. However, they should be considered in conjunction with other regulatory concerns, a point to be elaborated in section 6.

In terms of users, one can speak of an "taxonomy ecosystem". Users can be financial investors; banking and financial institutions; regulators; bond issuers and bank borrowers; credit rating agencies, verifiers, impact reporting institutions, and NGOs and scientific institutions; supranational and multilateral bodies; policy-makers, among other actors (World Bank 2020: 15-16). And the list of involved sectors and actors is even larger. Taxonomies can influence trade and international investment agreements or disputes. By influencing specific productive sectors and borrowers, taxonomies can affect income, employment and innovation dynamics.

3. TYPES AND SCOPE

There are broadly two types of taxonomies in terms of classifying the "alignment" of projects or activities with the stated objectives. One is the so-called "binary" type, of which the EU taxonomy is the main representative. The other is the "traffic-light" type, used by CBI, Singapore and other national and international taxonomies (such as the one being developed by ASEAN). A binary taxonomy establishes strict and exclusive "green" criteria. The project or activity under review must fulfil the requirements. For instance, the EU environmental objectives are: i) climate change mitigation; ii) climate change adaptation; iii) sustainable use and protection of water and marine resources; iv) transition to a circular economy; v) pollution prevention and control; and vi) protection and restoration of biodiversity and ecosystems. The EU taxonomy applies to projects and activities with significant environmental impact. That is, the list of projects and activities "eligible" for the taxonomy (either with the "green" or "brown" compliance label) excludes, for instance, professional services and other activities with almost no environmental impact (so called "grey activities"). Among the eligible projects and activities, to be qualified as green, projects and activities must make an improvement on any of the mentioned six objectives and do no significant harm (DNSH) on all of the others. If these criteria are not met, the project or activity is then considered as "not-aligned". This leaves a small portion of activities (1 to 5%) that qualifies as green (Odell, Dolmans and Cibrario Assereto 2022). Being "not-aligned" may discourage or penalize financial (trade and investment) flows into those projects or activities. The EU Technical Expert Group (TEG) explicitly rejected the inclusion of gas and nuclear energy among the eligible activities. Gas is a fossil fuel. In the case of nuclear energy (which is a low-carbon emission source of energy), the argument hinged upon the uncertainty regarding nuclear waste management, which may not meet the DNSH bar on the other objectives (TEG 2019).

A "traffic-light" criteria, in turn, has three colours (red, amber and green, though some use "orange"). Typical examples of traffic-light taxonomies are the Singaporean taxonomy, the CBI taxonomy, South African and Malaysian taxonomies. Typically, the amber colour is

meant to be applied to “transitional activities” (ICMA 2021). There are similar definitions of what makes a transitional activity (OECD 2022: Table AA1). Common considerations are: i) no technologically or economically feasible low-carbon alternative available; ii) do not have zero emissions but are on a path towards alignment; iii) have significant impact on mitigation or adaptation, facilitating emission reductions in the short-term; v) do not hamper the development of low-carbon alternative technologies and vi) do not lead to lock-in of carbon intensive assets. However, there is no general consensus regarding which activities are considered “red” and which are considered “amber” (GTAG and GFI 2023: 9). For instance, the Technical Expert Group of the European Union “Platform on Sustainable Finance” issued a report in 2022 in which they recommend adopting a traffic-light scheme, differentiate two types of “red”. On the one hand, activities that should be abandoned (such as solid fossil fuel power generation). In this case, there should be an encouragement of financing for decommissioning activities within this category. On the other hand, there are activities that must urgently transition (Platform on Sustainable Finance 2022: 27), and were improvements should be acknowledged even if they fall short of substantial contribution to alignment with environmental objectives, such as so-called “hard-to-abate” sectors (Odell, Dolmans and Cibrario Assereto 2022). In most of the cases (such as in the ASEAN, CBI, Singapore and EU taxonomies, among others) there are specific thresholds, screening criteria and benchmarks to be included as “amber” or “orange” (OECD 2022).

Binary taxonomies may exclude a significant number of sectors from being categorized as “green”. But there are dangers as well to a traffic-light type of taxonomy. First and foremost, there is the issue of greenwashing of some sectors, activities and entities, even in the fossil-fuel sectors. Another danger may be not moving fast enough, or sufficiently fast, towards environmental objectives. It is not so clear, however, that a traffic-light taxonomy slows down the transition towards a low-carbon economy. For instance, under the PSF 2022 recommendation, there should be an encouragement of financing towards the decommissioning of specific sectors (notably, fossil-fuels), and towards sectors that must urgently transition. A binary taxonomy may well exclude these sectors from much needed financing. The coverage and political economy of sectoral categorization will be discussed in section 5.

There is one major element of contention, raised by Elhers, Gao and Packer (2021 regarding the alignment with *several* environmental objectives. It refers to the independence or co-dependence of objective attainment. The topic can be exemplified with the EU taxonomy. As mentioned above, that taxonomy states six environmental objectives. To be classified as green, a project or activity must make a significant improvement on at least one objective, while doing no significant harm on the other five. In this sense, objectives are co-dependent. Fulfilling the DNSH on the other objectives may increase the cost of verification (particularly in relation to alternatives such as respecting minimum safeguards). However, allowing prospective borrowers to meet only one objective, with disregard to others, opens the door to greenwashing. On the other hand, including transition considerations involves *violating* the DNSH clause on other objectives. That is why most of the taxonomies that include transition considerations (such as the traffic-light taxonomies) have developed or are developing screening criteria and specific thresholds for these activities. Some taxonomies

(such as the Malaysian one) even require the implementation of remedial measures, while other countries (such as Japan) have introduced transition roadmaps for hard-to-abate sectors. Elhers, Gao and Packer (2021) make two recommendations on this topic. First, to set only one objective per taxonomy. Second, to include *entity* information and standards, so as to avoid greenwashing.

The dangers, difficulties and implications of complying with the objectives are compound if the project, activity and entity must include "scope 3" emissions in their disclosure. The different scopes of GHG emission recording refer to whether the emissions derived from the production process are directly or indirectly under the control of a firm or entity. Which scope (1, 2 or 3) to cover in the disclosure can have implications beyond the firm, such as international repercussions. Scope 1 refers to the emissions directly under the control of the firm or entity, from owned or controlled sources (McClymont 2021). Scope 2 includes indirect emissions from energy used during the production process but generated outside the facilities of the firm, out of its control (typically, purchases of energy). Scope 3, in turn, includes emissions even further away: They include all the emissions along the value chain and outside the control of the firm. Scope 3 emissions include both upstream (such as the emission during the production of inputs) and downstream emissions (such as the distribution of output and waste management). Scope 3 emissions reflect over 70% of total emissions on average supply chains (SBTI 2023). This is particularly the case for oil & gas industry, and for financial institutions, if one includes "financed emissions" (Thornton 2021). Including or not scope 3 emissions may change the eligibility of certain sectors, or their position in the "traffic-light" categories.

While challenging, there have been numerous developments for measuring and reporting scope 3 emissions, in part because of official pressure such as the European Union Green Deal (CDP 2024a). However, a resolution by the Securities and Exchange Commission (SEC) in 2024 did not include Scope 3 emissions as part of the mandatory climate disclosure for publicly registered firms. There are numerous and contested topics and implications related to the inclusion or exclusion of scope 3 emissions in the disclosure of firms, and the labeling of bonds. These topics will be discussed in section 5 (for the productive implications) and 7 (on the relevance for international trade).

4. A MAZE OF REGULATIONS

The global proliferation of green or sustainable taxonomies for investment and regulatory purposes creates a maze of regulations, standards and requirements, that opens the door for several problems and challenges. In this section, we highlight three potential issues: the "green spaghetti bowl" effect; the dangers of arbitrage and interoperability; and the de facto rise of a hierarchy of taxonomies, which may hinder national initiatives in "subordinated" countries.

The "spaghetti bowl effect" was a term coined by Bhagwati (1995: 2), in the context of an increasing number of bilateral Free-Trade Agreements (FTAs) in the 1990s. These agreements imply a confusing mix of crossed rules, norms and tariffs. A "green spaghetti

bowl effect" (GSBE) could be the unintended consequence of multiple taxonomies, for instance those adopted for regulatory purposes (other authors refer to a similar concept known as "the alphabet soup" (Frisch 2024: 6)). As an example, Boekhoff (2023) lists 15 major frameworks for Scope 3 disclosure. Among these, the ISSB launched the IFRS taxonomy in 2023. IOSCO, the leading international body for securities regulation, officially endorsed the IFRS and called on its 130 member jurisdictions to incorporate IFRS in their regulatory framework for climate-related disclosure by financial institutions and firms.

Several central banks and regulatory authorities have responded positively to that call. But the European Commission has its own European Sustainability Reporting Standard (ESRS), the main component of the Corporate Sustainability Reporting Directive (CSRD), which firms will have to implement starting in 2024 (for their financial reporting in that year). The CSRD applies to all firms operating in the EU, including non-EU firms with a turnover exceeding €150 million. It involves the disclosure of firms' impacts on a wider set of topics than the sustainable taxonomy itself (such as human rights, impact on indigenous populations, and others). It covers scope 3 emissions (while, as mentioned above, the SEC does *not* require disclosure of scope 3 emissions). In sum, obeying some rules (such as the IFRS, or SEC's rules) is not enough to meet the European ESRS, and this constitutes an example of the GSBE.

Different rules add complexity layers, duplication and fragmentation. A survey on financial markets participants by the OECD (2023) finds that "a lack of comparability in corporate disclosure of climate-related data and transition planning to be a relevant or very relevant obstacle" for development of corporate transition finance (OECD 2023: 47). Part of this lack of comparability may be because there are different reporting frameworks which are not perceived to be complementary between each other (CRD 2019: 6), and that there is a lack of clarity whether reporting frameworks are aligned with official recommendations (for example, with the TCFD recommendations). Even regulatory institutions such as central banks use different frameworks, sometimes more than one framework at the same time (NGFS 2022: 47) That is a reason for a spanning literature that addresses (and try to overcome) differences between taxonomies and frameworks (such as CRD 2019). Possible divergences and convergences between the ESRS and the IFRS were addressed in a joint work (EFRAG and IFRS 2024). Differences between the EU and the Chinese taxonomies were addressed by IPSF (2021). These differences point towards a major danger: That an investor or a borrower can arbitrage between taxonomies. It is debatable, however, what is the real impact of corporate disclosure rules on firms' GHG emissions (Frisch 2024).

The danger is greater if free capital mobility is a desirable objective, and national hurdles are to be removed. That is one goal of measures designed to ensure the interoperability of taxonomies (UNEP 2023). Interoperability reduces barriers for investors, helps international comparisons of financial flows and accomplishment of benchmarks and objectives, and avoids market fragmentation (UNEP 2023: 8). However, too much harmonization of standards may lead to dilute and ignore the importance of local contexts and particularities. Hence, alignment of taxonomies implies a *minimum* of commonly

accepted principles and elements, such as objectives, coverage and standards. These commonalities help reduce, in principle, the scope for arbitrage of investors and borrowers.

Therefore, in a report elaborated for the G20, the World Bank Group, the IMF and the OECD (WBG, IMF and OECD 2023) established six principles for alignment of taxonomies, particularly referring to climate change mitigation. These six principles are i) ensure positive material contribution to objectives; ii) avoid negative material contributions to other objectives; iii) dynamic and updated approaches; iv) good governance, transparency and applicability; v) science-based approaches for environmental objectives, and evidence-based approaches for sustainable goals; and vi) address transition considerations. UNEP (2023), in turn, presents a guide for designing a common framework of sustainable taxonomies for Latin America. On top of the same principles as in WBG, IMF and OECD (2023), UNEP (2023) establishes four elements or axes for alignment: the choice of objectives; sectors; activities; and screening criteria.

As mentioned above, these reports are intended as guidelines for common frameworks of green (or sustainable) taxonomies, without preventing each individual country from adapting its own taxonomy to domestic circumstances, for instance regarding the prioritization of other sectors, or additional objectives. There are some taxonomies (notably, the EU's) that served as examples for the design and development of others (Lombardi Stocchetti, Stranvag Nagell and Biro 2023). However, a "hierarchy" of taxonomies arises for reasons other than chronological precedence. For example, some taxonomies in developing countries have not been used at all (Hilbrisch et al 2023). One reason among others is the fact that taxonomies in developing countries are not legally recognized by major financial centres with major investors base, notably the EU. Therefore, European investors, or investors who also operate in the EU, lack clarity about whether projects or assets labeled according to taxonomies of developing countries are aligned with the EU taxonomy, even if the latter (EU's) served as a model for the former (developing country).

This hierarchy of taxonomies replicates financial system hierarchies. One solution for this issue was proposed by the High-Level Expert Group (HLEG) on Sustainable Finance of the European Commission, when they issued in 2023 their preliminary findings and recommendations for scaling-up sustainable finance in low- and middle-income countries. The solution was for the EU to grant legal recognition to the "conclusions of comparisons carried by the EU and partner countries on their taxonomies" (HLEG 2023: 9). Hilbrich et al (2023: 9) recognizes a precedent for this proposal: the Chinese Green Bond Principles (and the Common Ground Taxonomy between the EU and China, IPFS 2021) allow the use of the European Taxonomy to identify green bonds instead of the Chinese taxonomy. The proposal of HLEG (2023) is for the EU to adopt a similar approach, with. In fact, many taxonomies from Emerging Market Economies (EMEs) and Low- and Middle-Income Countries (LMIC) explicitly compare their approach to the EU taxonomy (as in the case of the Colombian Green Taxonomy, the Brazilian Sustainable Taxonomy or the Green Taxonomy of the Dominican Republic (Republica Dominicana 2024), see as well Lombardi Stocchetti, Stranvag Nagell and Biro 2023).

The call for interoperability of taxonomies and prevention of market fragmentation should include a legal companion in the main financial centres of the world, which is still absent. Some major economies (like Japan) can face market fragmentation (and a relative exclusion of international investors) better than others. For instance, this is the case of the "transition bond" market (Riordan 2020), currently a mostly Japanese market, because of the characteristics of its transition taxonomy, which are not recognized in other major taxonomies (such as CBI, or ICMA). These possibilities are not available for countries with less developed financial centres and a smaller investor base.

5. SECTORAL IMPACTS

The choice of eligible sectors and activities for national taxonomies is bound to have significant repercussions on multiple dimensions. On a first approximation, the election of sectors should be in line with stated objectives. For example, if climate change mitigation and decarbonization is one of said objectives, then the selection should attach more relevance to GHG emissions per sector over other criteria (UNEP 2023). That was the logic behind the inclusion of sectors in the CBI taxonomy. But the matter gets complicated when other objectives are involved. Furthermore, the inclusion of transition criteria, the choice to compute scope 3 emissions or not, the consideration of political economy factors (such as the productive structure, employment and income distribution), the impact on financial stability (a topic that will be developed in the next section), and international considerations, in line with the hierarchy of taxonomies mentioned in the previous section. To give an example about the latter dimension: In designing the Colombian green taxonomy, authorities reviewed existing taxonomies, particularly the EU's and CBI's. The IFRS taxonomy, instead, was developed to be used as a framework for disclosure and regulatory purposes, a reason for its comprehensiveness (77 sectors covered in the taxonomy, at the moment of writing this article). Furthermore, sectors can be classified differently in each taxonomy even under the same objective, for example if the targets or science-based criteria differ between the taxonomies, and we will provide some examples below.

The importance of objectives for the eligibility of sectors starts from the very choice of developing a *sustainable* versus a *purely green* taxonomy. Sustainable taxonomies include several Sustainable Development Goals (SDGs) among their objectives, such as poverty reduction or decreasing inequality and quality of access to services, which are typically absent from green taxonomies (Wang, Larsen and Wang 2020).Just to point one example: Mexico's sustainable taxonomy applies to sectors and activities that have specific impact in terms of gender and formal employment, a factor disregarded in purely green taxonomies such as the Colombian or the EU taxonomy. On that regard, the Brazilian sustainable taxonomy stands out among the rest because of the inclusion of strategic objectives on top of social and environmental goals, objectives such as technological development, increased productivity and economic competitiveness. This justifies, for instance, the inclusion of the mining sector and other extractive industries, which are not included in most of the green and sustainable taxonomies (such as the Colombian, Mexican or Rwandan taxonomies).

The inclusion of transition criteria and the DNSH clause (instead of minimum safeguards, for instance) are also relevant factors when considering the eligibility of specific sectors. As mentioned above, the DNSH clause was invoked by the TEG (2019) to justify the exclusion in their recommendations of nuclear projects and activities from eligible sectors. The rejection of transition criteria was a major determinant factor for recommending the exclusion of the gas sector. Instead, the inclusion of transition criteria is a major justification for the adoption of traffic-light taxonomies.

Eventually, the EU taxonomy *did* include the gas and nuclear sectors as eligible. Several countries (and some MDBs) followed the EU lead and included gas and/or nuclear as transition activities (Lombardi Stocchetti, Stranvag Nagell and Biro 2023). This shows that taxonomies have an inherent political economy dimension. The inclusion, exclusion (red label) or ineligibility of specific sectors has numerous reverberations according to specific productive structures, employment distribution, financial exposures and vested interests of multiple groups across different economies, with international repercussions (for instance, towards fossil-fuels exporters). In the case of the EU, there are several countries which depend on gas to replace coal as an energy source (for instance, Germany, Poland, Hungary), and other countries with active role of nuclear energy in their energy matrix (France, Belgium). The same holds true for other countries, including commodity exporters. Furthermore, the debate about the transitional character of gas extraction can be extended towards other sectors, such as mining, and hard-to-abate sectors such as steel, chemicals and water and air transport. As mentioned above, the Platform on Sustainable Finance recommended the inclusion of sectors that "must urgently transition".

To prevent greenwashing and enforce meaningful reduction in GHG emissions, some traffic-light taxonomies (that label some controversial activities or entities as "amber") require detailed transition plans from firms and other entities. In these plans, companies should explain how they will adapt their business model to align with the global and national goals of emission reductions (generally, net zero emissions). Transition plans provide a more "dynamic" and binding complement to taxonomies, in the sense that they reveal the actions that firms commit to implement in order to decrease their emissions CDP (2024b) reports an increasing number of firms disclosing their transition plans. CBI (2024b) sets guidelines to evaluate the credibility and robustness of transition plans, a mandatory requirement for entities with "amber" label. Being a "dynamic" complement to taxonomies, transition plans replicate many of the difficulties and challenges of the design and implementation of taxonomies. NGFS (2024) conducted a survey among financial institutions of advanced and emerging economies. According to the results, financial institutions from EMEs face particular challenges in the design of transition plans, especially in terms of multiple objectives of the plans, the constraints in terms of data availability and capabilities for developing those plans, and potential unintended consequences (such as divestment and credit rationing in key sectors of these economies).

Another factor to take into consideration that affects the choice of eligible sectors arises because of technological change. The dynamism of innovation and the adoption of new technologies in different sectors, may render obsolete previous technologies that were

once considered as “green”. The periodical update of taxonomies (a task recommended by most guides, such as UNEP 2023 or WBG, IMF and OECD 2023) may qualify as amber or red projects that obtained finance under the green label. Precisely, WBG, IMF and OECD (2023: 7) recommend the adoption of rules (without specifying which) to deal with the “legacy of green and sustainable bonds”. This concern is also highlighted in the Brazilian taxonomy (Brazil 2023: 55).

The choice of eligible activities and sectors has further implications for economic activity, employment and income distribution. A green economy requires shedding jobs in “brown” sectors and creating new jobs in the “green” sector (ILO 2018). There are associated changes in prices (for instance, energy and food prices) and wages. Carbon taxes have non-neutral impacts in terms of income distribution. Furthermore, these changes have territorial implications (OECD 2023): “brown” jobs are concentrated in regions, “green” jobs may be concentrated in other regions. Sustainable taxonomies tackle this issue from the very start, by including the importance of inequality, formal employment, gender dimensions and differentiated regional impacts (see for instance the Mexican and the Brazilian sustainable taxonomy). The required transformation is wide ranging. Fossil-fuel, chemicals, automakers and other “brown” companies are among the largest firms in EMEs, responsible for a substantial proportion of fixed investment, and with links throughout the productive structure.

The impact on the labour market is illustrative of the implications of the adoption of green and sustainable taxonomies. Though there is a debate about which jobs are actually “green”, according to the task, the technology or to the sector (Urban et al 2023, Apostel and Barslund 2024), Winkler et al (2024) estimate that in Latin America, the share of workers in green jobs (according to occupation and entity) is of only 9%. Those are jobs that require relatively higher levels of qualification (De La Vega, Porto and Cerimelo 2024). Instead, workers with low levels of income and education are more likely to be employed in non-green jobs. In that regard, the transition to a low-carbon economy (and the flow of finance towards those sectors) requires complementary policies to address joblessness, informality and income inequality.

The debates about the eligibility of sectors are replicated when we consider the inclusion of scope 3 emissions within the project, activity or entity. May the reader recall that scope 3 emissions capture the emissions throughout the whole value chain of a product. These emissions constitute over 70% of total emissions on average supply chains (SBTI 2023, Furdak, Nilsen-Ames and Wang 2022). Their inclusion (as in the EU ESDR) or exclusion (as per the SEC regulation) opens many angles for controversies. We will review a few, not all, of which have been developed in the literature. For instance, the exclusion of scope 3 emissions opens the door for the vertical disintegration of the production process, independently of the technical conditions. It may suit a firm to allocate the production of some input or downstream output to another entity (perhaps in another country), just to avoid registering those emissions in the production process under its control. This can easily be the case for outsourcing services. The very definition of what is (and what is not) part of the value chain is also open to debate. Do publicity services count as part of the value chain? Do cleaning services count as part of the value chain? And what about accounting for those

services that are provided to several firms at the same time (like transport, ICTs, and other examples)? What are the scope 3 downstream emissions of the tourist sector? One could think of many other examples that rise the same point: Where do we draw the contours of value chain, for the upstream and the downstream? The impacts may be felt as well on FDI flows, because of the feedbacks and interconnections between FDI and GVCs (Qiang, Liu and Steenberger 2021).

Assuming these questions have been solved, there are severe limitations about the recording of scope 3 emissions, challenges reflected in several surveys about the measurement, impact and adoption of scope 3 reporting (Furdak, Nilsen-Ames and Wang 2022, SBTI 2023, CDP 2024a, Klaver et al 2023, among others). On the one hand, they depend on the density of the productive process, supplier fragmentation, disintermediation (with suppliers farther away in the value chain), and how many links of the value chain are under the control of the firm. This has implications for the number of actors involved in the recording of emissions. The disclosure of scope 3 emissions requires full traceability through the whole value chain, which may be challenging for raw materials production, for instance.

Moreover, engaging unwilling participants in the value chain may be a difficult task. One of the major challenges for measuring scope 3 emissions refer to power relations and influence distribution within a value chain (Klaver et al 2023: 21, SBTI 2023: 19). Another difficulty refers to the lack of capabilities and the costs of compliance with the disclosure, particularly for SMEs and producers in EMEs (ibid). The benefits may not be actually worth the costs of tracking down GHG emissions for some entities. Power relations also influence the ultimate incidence of cost increments, whether they are absorbed through profit margins in different links of the value chain (for instance, if prices of commodity inputs are determined in international markets) or if they are translated into higher final prices. Furthermore, each of the possibilities may also affect income distribution (prices, wages and rent) within the chain, downstream and upstream, according to the linkages, bargaining power and political considerations.

Another challenge for recording scope 3 emissions is the proliferation of disclosure standards (Klaver et al 2023: 17, Ducoulombier 2021), which are not comparable with each other. Harmonisation of frameworks is a desirable development. Technology for improving data collection seems like a solution for some of the problems highlighted in this section, but there are also doubts about it. Artificial Intelligence could be used for improving GHG recording. Blockchain technologies can improve traceability (for instance, in the agricultural sector). However, these are energy-intensive technologies and may have a bearing on total emissions. Furthermore, they may be responsible for a substantial portion of scope 3 emissions in several sectors like ICT, finance, retail, etcetera. Technology may imply another challenge difficult to surmount, if there are low possibilities for substitutions (of inputs, of clients, of waste management, etc.). There are also international ramifications of recording scope 3 emissions, which will be tackled in section 7.

Finally, the sectoral impact is also exposed to the GSBE, because of differences in science-based metrics, thresholds and objectives. For instance, different taxonomies have different Key Performance Indicators (KPIs) for classifying projects with similar GHG

emission intensity. The choice between absolute emissions or carbon intensity may be the difference for cataloguing activities as “green”, “amber” or “brown”. The problem intensifies if investors are also registered in overseas jurisdictions with different taxonomies. ATF SG (2023: 35, 51-52) illustrates with a case in which a project could be labeled as “amber” using the ASEAN taxonomy, or as red using the Thailand taxonomy, because of different thresholds for emission reduction. Deeper questioning about the meaning and use of science-based benchmarks is presented by Reisinger, Cowie, Geden and Al-Khourdajie (2024). They criticize three aspects. First, science-based targets focused on “net-zero CO2 emissions by 2050” are misleading and incorrect. There should be net-zero emissions of *all* GHG, followed by a long period of *negative* emissions. Second, they criticize the exclusion of carbon removal off-sets from the count of reduction of emissions. They call instead for a wider set of options, with greater disclosure by the corporate sector. And finally, they highlight the unequal distribution of reduction of emissions: Rules look at deviations from historical averages, but those firms or countries with higher historical averages will be allowed higher emissions (Reisinger et al 2024: 2), putting a greater burden on developing countries.

6. FINANCIAL CONSIDERATIONS

Green or sustainable taxonomies have the task of addressing a type of market failure caused by information asymmetries (IMF 2023, ESCAP 2023). Given the role assigned to mobilizing private capital for climate investment (World Bank 2015), taxonomies should “enhance market transparency, market integrity, and alignment with climate objectives to foster positive outcomes for climate impact” (IMF 2023: 81). Otherwise, there may be incentives for inefficient allocation (Ledyard 2008). However, there is recognition (World Bank 2020, Brazil 2023) that taxonomies can also serve as guidance for direct public policy actions such as public procurement and public investment, including public equity stakes (Palladino 2024). This type of intervention is particularly suitable for high-risk projects such as renewable energy and innovation in renewable energy, which are long-term projects (Mazzucato and Semieniuk 2018), and particularly for developing countries, which observe higher costs of capital (IEA 2023). In that sense, taxonomies can serve as a tool for coordinating efforts by the State, crowding in private investment (Acemoglu, Aghion, Bursztyn and Hemous 2012). This can even outweigh the impacts of lower credit provision to “brown” firms and their reduced investment (Kacperczyk and Peydro 2024).

Beyond the approach to deal with information asymmetries and other forms of market failure, there are other channels for the possible impact of green and/or sustainable taxonomies on financial stability. One major, though uncertain, impact operates through profitability. Minimizing information asymmetries should lower the cost of capital for the borrower. The incentives for the lender are more related to reputation, positioning, and (increasingly) fulfilling regulatory requirements on portfolio composition. Tellingly, the literature does not find a significant or relevant green premium or “greenium” for green bonds (Larcker and Watts 2020, Löffler et al 2021, Lau et al 2022). Aswani and Rajgopal (2024) find that *only* financial firms issuing green bonds significantly enjoy a greenium, particularly

in the secondary market. Furthermore, there is no significant reduction in GHG emissions *after* issuing green bonds. Aswani, Raghunandan and Rajgopal (2024), in turn, find that stock returns are *not* correlated with emissions data disclosed by firms (though there is a correlation with emissions disclosed by the data vendor).

Another channel refers to the rise of stranded assets and their implications on the balance sheets of lenders, borrowers and investors. Green taxonomies seek to discourage finance to specific sectors (notably, coal and oil production), except in what refers to investment for decommission of these sectors. The assets, capital goods and infrastructure linked to these sectors has to be written down, unless some of it can be repurposed for other activities. Among the assets that need to be written down are oil and coal reserves, capital equipment for production, and eventually loans to these sectors. Stranded assets are a transition risk, not only for lenders, but also for investors. Daumas (2024) provides a thorough review of the different methodologies for estimating the risks associated with "transition financial risks", including asset stranding risks, and finds a diversity of methodologies which render comparison a difficult task. Alessi and Battiston (2022) estimate that Euro Area investors have a portfolio composition more exposed to transition risks (including stranded assets) than to "greenness", defined as investment aligned with EU taxonomy for sustainable activities. Moreover, Semieniuk et al (2022) estimate that most of the transition risks associated with fossil-fuel stranded assets are in the hands of OECD investors, including pension funds.

However, the impact of stranded assets is not limited to financial stability nor to advanced economies. Developing countries hold the majority of fossil fuel reserves, and most of these are under the control of state-owned enterprises (Heras and Gupta 2024). Therefore, fossil-fuel stranded assets may have an impact on public revenues and financial stability in some of the countries which are the most exposed to climate change. Furthermore, as mentioned above, these are major companies responsible for the larger share of fixed capital investment in their home countries. Impacts, and policies to deal with them, are crossed by political economy considerations, including income distribution, employment and bargaining power between different sectors.

While this work focuses on private markets, there is a word to be said on this regard about financing flows from Multilateral Development Banks (MDBs), which finance both sovereign and privately owned projects across their different windows. As mentioned above, the MDBs have issued a list of criteria and activities which are considered for climate financing, under the "Common Principles for Climate Mitigation Finance Tracking". This list limits the eligibility of fossil-fuel related activities, though it also includes transition criteria (particularly, allowing for economically viable technologies). While keeping fossil-fuels in the ground is a requirement for a 1.5°C trajectory, there needs to be a debate about financing and compensating developing countries (particularly in Africa) and allow them to adopt a development strategy based on renewable energy, and with higher value added.

The involvement of international financial institutions is not limited to the (lack of) financing by MDBs. MDBs have traditionally played the role of "market catalyzers", helping to develop the infrastructure and the capabilities for new markets. The green bond market

itself is an example, as mentioned above. But some international institutions, such as the IMF hold even greater power because they may include additional requirements in their lending programs. In fact, green taxonomies have been included as a requisite among the conditionalities of the access to the Resilience and Sustainability Facility (RSF), as can be attested in the case of Paraguay (IMF 2024a) and Jamaica (IMF 2024b). In both cases, the programs state two uses of green taxonomies: mobilization of financial resources, and financial supervision of climate-related exposure. The latter is an indication that stranded assets are not the only climate-related risk threatening financial stability.

Financial stability is not only at stake due to *stock of loans*, but also due to the *flow of new loans* and its impact on bank profitability. The impact on profitability extends beyond the impact on borrowing costs, or on the costs of meeting regulatory requirements. In fact, complying with environmental requirements, and lending to firms that do comply, may not lead to improved profitability and could actually increase risk exposure, if the market does not validate the behavior of the firm (Hopper 2024). After all, taxonomies are focused on "environmental" materiality (the impact of projects/activities/sectors on environmental and/or social goals) and do not take into consideration "financial" materiality. This may lower the incentive to adopt green taxonomies or to invest in labeled bonds. There is mixed evidence on the impact of green loans on bank profitability and credit risk (Mirza, et al 2023, Zhou et al 2024, Fata and Arifin 2024). Furthermore, even penalizing "brown" firms by reducing their lending may not be enough to reduce their GHG emissions, as found by Kacperczyk and Peydro (2024). These findings corroborate the importance of *mandating decommissioning*, as suggested by the Platform on Sustainable Finance (2022).

The private market has developed its own ways to deal with information asymmetries and prevent greenwashing. One such development is ESG criteria. However, the success in preventing greenwashing through ESG ratings is debatable (IOSCO 2021). First, ESG ratings do not capture the alignment of a firm's activities with climate or social-oriented goals (Gratcheva et al 2021). Instead, they capture the potential impact or exposure of firms' profitability to physical and transition risks. In other words, and contrary to the concern of taxonomies, ESG ratings are predominantly concerned with financial materiality and with little regard (or to say the least, unclear commitment) to environmental materiality. Furthermore, the criteria used to assess ratings also holds little connection to environmental practices (Simpson, Rathi, and Kishan 2021). Second, ESG methodologies and ratings differ significantly among rating agencies, to the point that there is a *negative* correlation among ESG rating assessments of major rating agencies (Berg, Koelbel and Rigobon 2022, Sica et al 2023). Moreover, IPSF (2021) count over 100 sustainability-related data products. And finally, there is still substantial misalignment between private-labeled ESG ratings and official taxonomies, such as the EU taxonomy (Dumrose, Rink and Eckert 2022). These problems (the divergence between ESG methodologies, and with green and sustainable taxonomies) has been acknowledged and documented by the European Commission (EC 2023) To correct this divergence, the EU announced rules in 2023 that would strengthen the regulation of rating agencies operating in the EU, in order to increase transparency and reliability of ESG ratings, and the alignment of methodologies with the EU taxonomies.

7. INTERNATIONAL CONSIDERATIONS

As mentioned above, whether national taxonomies can be recognized by other jurisdictions influences portfolio, other investment flows (equities, bonds and loans) international trade and FDI. However, the push to capital inflows from the adoption of green and sustainable taxonomies will be mediated (and in particular circumstances, counteracted) by global financial considerations (Bortz and Toftum 2023). The volatility presented in the flows of finance towards climate and social-aligned projects (captured in CBI 2024a) reflects this dependence, and it is also present in cross-border climate finance. If taxonomies are going to mobilize additional international finance, then the influence of (positive) regulatory changes must prevail over the fluctuations of international financial conditions. It is doubtful whether taxonomies can compensate for fiscal, financial or balance-of-payments complications.

The international dimensions of the proliferation of green and sustainable taxonomies are not exclusively captured by movements in the balance of payments. For instance, headquarters of multinational companies may mandate subsidiaries overseas (and they often do) to invest in sustainable debt instruments. These investments are “domestic credit” and do not appear in the balance-of-payments (that uses residential criteria for registering, instead of nationality, see Avdjiev, McCauley and Shin 2016). However, headquarters can require their subsidiaries to invest in certain instruments, and not in others, depending on the taxonomies at stake. This may be due to the (lack of) legal recognition of taxonomies between different jurisdictions, as mentioned above. On top of legal matters, the “international taxonomy hierarchy” can develop due to relative sizes of investor base, and that can be an obstacle when taxonomies differ.

The importance of which criteria to use for the selection of eligible sectors increases when we add trade profiles to the picture, a factor omitted in most guidelines (an exception is UNEP 2023). Taxonomies may discourage direct financing or FDI flows into the sectors that provide most of the FX revenues in developing countries (UNEP 2023) and complicate reserve accumulation. Renewable energy is certainly harder to export than fossil fuels, particularly to distant consumption centres such as Europe or China. So, the adoption of taxonomies may weaken (instead of encouraging) credit conditions in developing countries. Global initiatives are required to compensate developing countries for their revenue loss and to stimulate the diversification of their exporting base.

A particularly complex implication of green and sustainable taxonomies in the international trade arena refers to the potential impact of Scope 3 emissions. As mentioned above, scope 3 comprises on average between 70 and 90% of GHG corporate emissions (Klaver et al 2023, SBTI 2023), and a large portion of these emissions are due to overseas operations of the whole value chain. This is one of the difficulties in reigning on scope 3 emissions, let alone recording of emissions. However, this does not prevent the imposition of mandatory recording and registering, for instance by the CSRD. The recording of scope 3 emissions is important because, among other factors, the European Commission will

impose a carbon tax on firms. This would put European firms and European production in disadvantage in relation to imports, on at least two accounts. First, firms would have to pay a higher price compared to international competitors. And two, European firms may choose to expand overseas production at the expense of domestic production, since the former is not taxed as the latter. Therefore, the EU will implement a Carbon-Border Adjustment Mechanism (CBAM), a tax on imports related to their carbon footprint. This measure will have multiple implications.

One of these implications is that it seeks to prevent shifting the “brownest” stages of goods production to other countries. This effect, called carbon “leakage”, happens when “carbon emissions rise in countries with weak carbon regulations because stricter regulations in other countries make unregulated markets more attractive and competitive” (Brenton and Chemutai 2021: 67). That means, CBAM affects not only trade, but also FDI flows. There are different estimations of which country or region is the most exposed, but there is a consensus about the substantial impact to exports from developing countries, particularly those in Africa (Perdana and Vielle 2022, Magacho, Espagne and Godin 2024, ACF and LSE 2023).

That impact on countries with lower capabilities to adapt their production, and with less responsibilities in terms of historical emissions, stands in contradiction with the “common but differentiated responsibilities and respective capabilities” principle, enshrined in the Article 2 of the Paris Agreement (Dadush 2021, Marin Duran and Scott 2024). Furthermore, the revenues originated from taxing (particularly)developing countries’ exports are not destined to facilitate technology transfer nor investment for low-carbon productive reconversion in those countries.

The recording of scope 3 emissions along the whole value chain therefore has implications for productive specialization. In principle, the service sector is benefited at the expense of more polluting manufacturing and commodity production (Liu, Chen and Shan 2022). When the topic is analyzed from a cross-border perspective, it has clear implications for positioning in global value chains. Ates and Sanlisoy (2024) find that GHG emissions decrease when the level of participation in GVCs and foreign value added (FVA) increase, similar to what Assamoi et al (2020) find for Asian countries.

A final point to make, is that green and sustainable taxonomies and disclosure rules are already influencing preferential trade agreements (PTAs) (WTO 2021). For instance, there are an increasing number of clauses on carbon emissions and carbon intensity, deforestation, land use, protection of biodiversity, labor rights and other issues, included in (new or modified) agreements that were signed and in others that were abandoned. However, Young and Clough (2023) and Mate Balogh and Mizik (2023) find that there is very little impact of FTAs on emissions reduction. Furthermore, there is evidence that trade liberalization leads to increased activity in emission-intensive sectors in low- and middle-income countries (Young and Clough 2023: 401). While PTAs have increasingly included environmental clauses and chapters, the actual environmental impact of FTAs should look beyond these items and adopt a holistic approach. For instance, the inclusion of an Investors-State Dispute Settlement (ISDS) arrangement may collide with more stringent or

just different national initiatives, weakening the impact on environmental goals (Young and Clough 2023: 414). In short, environmental clauses and climate policy has been used more as a non-tariff trade barrier, with selective carrots and sticks, than as a proper global-oriented climate policy (Kaufman, Saha and Bataille 2023).

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