

Effects of environmental provisions in international trade agreements on businesses and economies – a systematic review

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Abstract

Purpose – International trade and its effects on the environment are increasingly discussed both in academia and by policymakers. To counter negative effects of international trade on the environment, so called environmental provisions have been integrated in trade agreements aimed at businesses and economies. However, as both the intent and effectiveness of these provisions are controversial, this paper aims to provide an overview of the current state of research and identified key factors influencing their effectiveness.

Design/methodology/approach – The authors conduct a systematic literature review of 44 papers on the effects of environmental provisions in international trade agreements on the environmental performance of businesses, as well as economies from 1992 to mid-2024.

Findings – The integration of environmental provisions into trade agreements generally has positive effects on the environment while their effectiveness is influenced by their design and several boundary conditions. Alongside the importance of effective enforcement mechanisms, reputation concerns of businesses and lobbying are discussed as intermediary factors in the design and impact of environmental provisions.

Practical implications – The insights can benefit policymakers to optimize future environmental provisions and advance the effectiveness of policies aimed at balancing the effects of trade liberalization with environmental protection.

Social implications – Social sustainability is increasingly relevant for creating more sustainable trade policy while societal mechanisms seem to be an adequate tool to ensure effective enforcement of ecological provisions.

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Originality/value – To the best of the authors’ knowledge, this review is the first of its kind to provide a systematic overview of the literature on the effectiveness of environmental provisions that combines the micro-level of businesses and macro-level of economies, although the importance for trade in general and environmental protection, in particular, has been recognized in the academic literature.

Keyword Sustainability transformation

Paper type Literature review

1. Introduction

To achieve a sustainability transformation in alignment with the United Nations Sustainable Development Goal (SDGs) and the net zero emissions pledged by many countries, urgent action and substantial economic and policy changes are required at both the micro and macro-levels (Christ *et al.*, 2023; IPCC, 2022; United Nations, 2015). One potential strategy is the inclusion of environmental sustainability, a key aspect of the SDGs, into international trade agreements. This approach promises to link the economic and environmental performance of multiple countries, their markets and businesses and thus potentially creates considerable leverage for a green economic transition. Against this backdrop, the environmental impact of free trade and policies to influence this impact have become a widely debated topic, both in academic discourse and policy circles (Ferrara *et al.*, 2009; Yao *et al.*, 2019; Brandi and Morin, 2023).

Particularly in the context of climate change with greenhouse gas emissions reaching the highest levels in human history (IPCC, 2022), the nexus between trade and the environment plays an increasingly important role (Damert and Baumgartner, 2018; Sorgho and Tharakan, 2022). The extent to which the international community succeeds in increasing sustainability in trade, assessed by its contribution to create sustainable economies and businesses, is by now seen to be a key factor for promoting sustainable development (Ählström and Sjöström, 2005; Brenton and Chemutai, 2021). Whereas *multilateral environmental agreements are criticized as ineffective* (Andresen *et al.*, 2012; Heid and Márquez-Ramos, 2023), the incorporation of environmental provisions into trade agreements as an instrument of environmental protection has been adopted by many states since the 1990s (Colyer, 2012).

While linking trade agreements with environmental considerations also generated opposition (Anderson and Brooks, 1996), the USA and the European Union (EU) have been incorporating environmental provisions into their agreements with increasing determination for several years. Since the Trade Promotion Act of 2002, the USA is required to incorporate environmental provisions into each of its free trade agreements (FTAs), while the EU integrates so-called “Trade and Sustainable Development” Chapters into FTA since several years in coherence with the aim of establishing sustainable development as a core element of EU trade policy (Zurek, 2020), a strategy which has been confirmed in 2021 in the “The Trade Policy Review” (de las Heras, 2023).

Parallel to these global concerns, on a microeconomic level, companies progressively adopt sustainable business approaches, not least because of increased institutional and societal pressure to address their impact on the environment (Andersén *et al.*, 2020; Gupta and Innes, 2014; Kalyar *et al.*, 2020; Nadel *et al.*, 2016; Nguyen *et al.*, 2023). The assessment and subsequent management of sustainability performance is increasingly relevant to stakeholders in and beyond the business realm (Silva *et al.*, 2019). These developments are encouraging scientific discourse on developing appropriate and effective tools that support sustainability in corporate practices, investigate challenges to these efforts and critically examine the external conditions driving and restricting the sustainability transformation of businesses (Leung *et al.*, 2023; Negash and Lemma, 2020; Pinto, 2020; Silva, 2021).

In this context, sustainability management approaches, such as environmental management systems, provide companies with a set of tools to manage their resources and manufacturing

process and support achieving a higher overall performance in the economic, environmental and social dimension (Arimura *et al.*, 2008; Gangi *et al.*, 2020; Günther *et al.*, 2016; Nadel *et al.*, 2016). Against this backdrop, we argue that environmental provisions integrated in trade agreements can be driving factors in the adoption of suitable environmental and sustainability management approaches like environmental sustainability assessment, environmental management systems and control (Günther *et al.*, 2016; Keysar, 2005).

From a governance perspective, we argue that environmental provisions have the potential to act as an institutional incentive to link global environmental governance with the promotion of businesses' environmental sustainability, thus enhancing the collaboration between companies and governance actors recognized as central by the sustainability literature (Harris, 2003; Adams and Petrella, 2010; Louche *et al.*, 2021).

However, current research shows that both the intent and the effect of these provisions remain controversial, as for example, the EU's Trade and Sustainable Development chapters only repeat already existing obligations on, e.g. biodiversity and are, therefore, described as mere "tactical linkage" and unlikely to mitigate the overall net negative impact of trade on biodiversity (Muller, 2023). Trade agreements are subject to much debate, particularly with regard to the supposedly inherent conflict of interest between increased economic activity and environmental sustainability (Brandi and Morin, 2023). In contrast, Baghdadi *et al.* (2013) find that trading partners who have signed trade agreements with environmental provisions have fewer emissions than other nations. The effect of World Trade Organization (WTO+) commitments, such as environmental norms in regional trade agreements, examined by Saucier and Rana (2017), seems to be that environmental protections greatly improve the flow of goods across borders. These controversial findings, some in favor (e.g. Baghdadi *et al.*, 2013; Saucier and Rana, 2017) and some against (e.g. Muller, 2023) the inclusion of environmental provisions in trade agreements, indicate that the current academic literature is fragmented.

This fragmentation potentially reflects the difficulty to analyze the impact of sustainability policies, particularly environmental provisions in trade agreements, as it is methodologically challenging to isolate their impact from other regulation dynamics (Zurek, 2020). Against this backdrop, it has been argued that an ex post impact analysis with an emphasis on the effectiveness of the provisions' implementation is the best approximation to valid results (Zurek, 2020). Given the fragmented nature of the existing literature and acknowledging that the research designs of individual studies chose different approaches to address the methodological challenges, we believe that a systematic analysis of the research findings to date provides an added value to the sustainability debate through synthesizing the strengths of their findings. Although there is no simple or *a priori* generalizable answer to the question of the effectiveness of environmental provisions and they are likely to remain contested by both profit-oriented as well as environmentalist groups, this systematic compilation of research findings can provide a comprehensive and nuanced overview of the existing knowledge on their effects, helping to clarify key insights amidst the existing methodological challenges.

This paper conducts a systematic review aimed at providing comprehensive insights into the effects of environmental provisions in trade agreements on businesses and economies. The review contributes to the academic literature in several ways. First, to the best of our knowledge, this is the first and only study that provides a systematic literature review and analysis of the controversial results of environmental provisions in trade agreements, including micro and macro-level effects, from 1992 to mid-2024 and thus not only traces their development over time but also considers current developments like climate-related provisions and the linkage to digital trade provisions. This enhances the historical understanding of the emergence of deep trade agreements as well as the ground for the future optimization of environmental provisions.

Second, with regard to the challenges when striving for a sustainability transformation across micro and macro scale, the study highlights the need for integrating micro and macro-level in sustainable policy approaches, as levels entail certain mediating factors that influence the policy outcome. For example, one potentially important micro-level effect of environmental provisions, environmentally-oriented technological spillover effects to businesses, cannot be estimated through analyzing the macrolevel adoption of domestic environmental regulations but call for a micro analytical lens. Third, the study is relevant from a social dimension because it shows how environmental concerns of citizens, which have historically been treated separately from international trade regimes, can be given salience through enforcement mechanisms of environmental provisions in trade agreements, which are considered to be essential for their effectiveness (Hassan et al., 2024).

After introducing the key concepts and theoretical frames applied in this study, the methodology is described and justified. This is followed by a presentation of the results from a systematic review. In this context, we analyze both micro and macro-level effects of the provisions. Finally, the discussion part conceptualizes critical elements of effective provisions design and implementation by including temporal and spatial differences and mediating factors as well as the relevance of enforcement mechanisms of the provisions. We conclude by outlining both comprehensive and specific implications for future sustainability research and policymakers aiming to enhance green economic transformation.

2. Key concepts and theoretical framework

2.1 Potential effects of free trade on the environment of local economies

The potential risk of free trade on the environment by creating externalities has been broadly discussed. To conceptualize the different effects of trade on the environment, it is necessary to decompose the relevant factors. Here, we draw on two prominent economic models focusing on international trade, the Heckscher–Ohlin model (Heckscher, 1991) and its environmental implications and the pollution haven effect (Levinson and Taylor, 2008).

According to the *Heckscher–Ohlin model*, the dynamic of international trade is characterized by industrialized, capital abundant countries trading goods with developing countries that are, in turn, labor abundant. Deduced from the model are three potential effects on the environment (Grossman and Krueger, 1991): The first effect, the *scale effect*, describes that international trade increases economic activities, which, in turn, increases environmental pollution (Grossman and Krueger, 1991, p. 3). The second effect, the *composition effect*, describes that the dynamic of countries specializing according to their competitive advantage in international trade might lead to more environmental pollution, if the difference between the trading partners lies in varying levels of environmental protection (Grossman and Krueger, 1991, p. 4). The third effect, the *technique effect*, describes that the pollution level of production might decrease due to a technology transfer induced by trade liberalization and rising incomes that lead to a higher demand for stricter environmental policies (Grossman and Krueger, 1991, p. 5). The level of negative externalities and the impact on the environment thus depend on how these individual effects are weighted.

In accordance with the Heckscher–Ohlin model, the *factor endowment hypothesis* assumes that trade patterns are a result of comparative advantages through different endowments or technology (Copeland and Taylor, 2004). Not primarily focusing on environmental aspects, it predicts that environmental policy has little to no trade effects (Copeland and Taylor, 2004), while the focus of capital abundant countries on capital-intensive production suggests them to be pollution intensive (Antweiler et al., 2001; Cole and Elliott, 2005).

In contrast, the *pollution haven effect* (Copeland and Taylor, 1994) focuses on environmental regulation disparities and describes that stricter environmental legislation in high-income countries causes companies to outsource pollution intensive production

processes to countries with lower income and less regulation. Because of the difference in their factor endowments, countries with high regulation specialize in the production of clean goods while less regulated countries become “pollution havens” (Taylor, 2005). Globally, the net aggregated pollution increases (Taylor, 2005).

However, the empirical validity of this hypothesis is contested (Levinson and Taylor, 2008). Against the background that the theory assumes various effects of trade on the environment and that these are potentially, if not necessarily, harmful, a response to continuous environmental degradation linked to international trade seems requisite. Environmental provisions in FTA might thus provide an adequate countermeasure.

2.2 Free trade agreements and environmental provisions

FTAs, according to the European Commission (2022), are agreements that decrease or eliminate trade barriers to the exchange of products and services between two (bilateral) or more (multilateral) participating nations aimed at enhancing trade between the participating nations. Potential positive effects connected to FTAs are job creation or development of local economies. Potential negative effects such as environmental degradation can arguably be countered by environmental provisions (Baghdadi *et al.*, 2013). The intention of these provisions is to avoid the pollution haven effect, and to create an incentive so that the different effects discussed in the Heckscher–Ohlin-model result, namely, through the high weight of the technique effect and a limitation of the composition effect, lead to an improvement of the environment rather than its deterioration.

In this paper, the term “environmental provisions” is used in accordance with the trade and environment database (Berger *et al.*, 2017). The term “provisions” covers all forms of provisions with a broad range of environmental issues, including deforestation, biodiversity, water, fisheries, and forests and air pollution and climate change with different levels of enforcement from aspirational to enforceable (Brandi *et al.*, 2022). In contrast, terms like “clauses,” “norms” or “rules” imply a certain level of obligation for the included clauses in trade agreements (Berger *et al.*, 2017). Considering that environmental provisions are applied in a multitude of different settings, conducting an analysis that allows to draw conclusions about the general effectiveness of this policy tool is challenging.

Against this background, this systematic review adopts an approach that includes both the macro (i.e. international as well as national and regional policies) and micro (e.g. businesses and their practices) level as loci of impact of the provisions. More specifically, it builds on studies analyzing the region-wide effect of environmental provisions as well as studies focusing on the potential effects on corporate environmental management.

2.3 Effects of environmental provisions on businesses

To achieve environmental protection, environmental provisions need to either directly affect local businesses and their approach to environmental protection or indirectly through the introduction of local environmental regulation aimed at businesses. The advantages of such environmental protection regulation for businesses are highlighted by the Porter Hypothesis (Porter and Van der Linde, 1995). According to the hypothesis, a more stringent environmental policy increases the competitiveness of businesses if they produce sustainable goods and invest in process innovations, overall striving toward creating shared value for business and society.

As part of this review, we therefore, identify a potential chain of effects. The introduction of environmental provisions in bi or multilateral FTAs are aimed at environmental protection. The mechanism of impact of the environmental provisions comprises two potential levels that can be addressed through the political and legal design of the clauses. Requirements can either directly affect businesses practices by setting standards like requiring them to comply with environmental management system norms (micro-level) or

indirectly by requiring the member states of the trade agreements to introduce environmental regulation (macro-level).

Figure 1 breaks down the potential chain of effects that we have identified, differentiating the micro and macro-level. In particular, Figure 1 provides an overview of how environmental provisions in trade agreements can affect both macrolevel regulation as well as micro-level effects on increasing sustainability in businesses. This proposed framework provides guidance for the coding categories in our analysis, where we differentiate macro and micro-level. The figure is referenced again in our discussion, where we specify how the academic literature discussed the links we identified, for example, the percentage of articles in our sample that discuss micro or macrolevel.

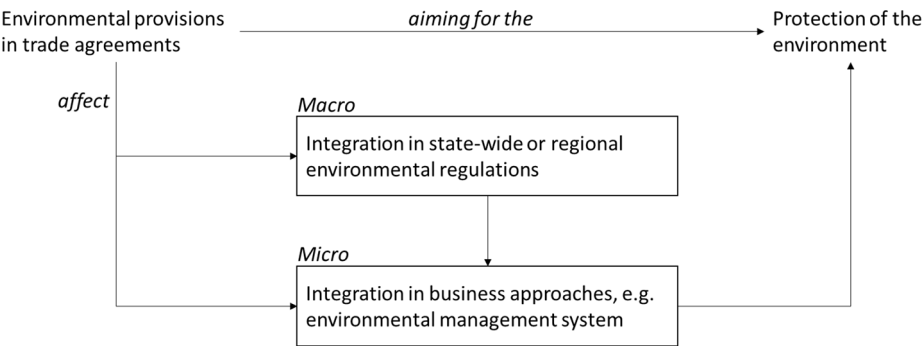
In essence, the growing importance of ecological problems has led to a multitude of different market-oriented measures in international trade with the aim of environmental protection. To do justice to the growing complexity of international trade, the scope and chain of effects, this review systematically analyzes the controversial and fragmented academic literature to provide insights into the effects of environmental provisions in trade agreements.

3. Method

This analysis applies the method for systematic literature review developed by Tranfield et al. (2003). Their approach structures the process of the analysis into three steps, from Planning the Review, to Conducting the Review, to Reporting and Dissemination. Having identified the research gap, the search string “trade agreement” AND “environmental provision” AND (impact OR change OR transform OR effect OR influence OR business) was developed.

The first two search terms reflect the central link between trade agreements and environmental provisions in this analysis. After much reflection, “environmental provisions” was chosen as a term rather than the broader focus on sustainability, which could have covered social and societal concerns as well. However, due to the complexity, a specific focus on environmental provisions was selected as specific aim.

The third term aims at capturing the relevant impacts of these trade agreements, using a variety of descriptions to cover different effect mechanisms. The strength of the developed search string stems from the fact that it delivered results on both a micro and macro-level. The search string was entered into seven different databases: Web of Science, JStor, Scopus, Science Direct, EBSCO Host, Emerald Insight and Wiley. A wide range of databases was



Source: Authors’ own work

Figure 1. Potential effects of environmental provisions

chosen to get results from different disciplines, as the research question includes aspects of the fields of business studies, economics and political science (among others). The search string was not modified for the different databases, except for formal adjustments.

The search was conducted in July 2024 (therefore, the search period included no starting date but ended mid-2024 to include the most recent articles possible). This search yielded a total of 542 results across all seven databases. A total of 135 articles were excluded because they were duplicates. The study included only articles from peer-reviewed journals to ensure solid and consistent quality standards. This led to the exclusion of further ten results. After these formal exclusions, the titles of the results were checked to eliminate all results that did not match the research question, which reduced the findings by another 250 results. While five articles were not available, sorting the results according to the described criteria resulted in a sample of 142 articles for review of abstract and full paper. See [Table 1](#) for detailed search results.

The 142 articles were subject to an abstract review, using the following filter:

- articles mentioning only expectations for trade agreements with environmental provisions, but not their actual implications;
- articles dealing with international environmental agreements and not trade agreements; or
- articles only analyzing the development and design of trade agreements, leaving out their implications.

At this stage, it became apparent that particularly older articles, either discussed the design from a purely legal perspective or merely identified potential impacts without empirically testing them. While many more recent papers were excluded due to a lack of focus on our core topics such as investment treaties – thus involving a different dependent variable – it was mostly the more recent articles that matched our criteria.

Based on the abstract review, four main analytical categories were identified inductively, which are described in the following overview. Based on the categories, the remaining 44 results were analyzed deductively. Throughout the process, the categories were specified through regular discussions, adding subcategories and detailed explanations. An overview of the categories is presented in [Table 2](#).

Table 1. Search results

Database	Scopus	JStor	Web of Science	Science direct	EBSCO Host	Emerald insight	Wiley	Total
Search results	78	24	324	7	97	7	5	542
Duplicates	13	5	75	3	38	0	1	135
Publication type	0	0	6	1	1	1	1	10
Title review	24	10	188	2	22	3	1	250
Abstract review	16	1	45	1	28	3	2	98
Not available	1	0	2	0	2	0	0	5
Total	22	8	8	0	6	0	0	44

Source: Authors' own work

Table 2. Overview coding categories

Coding category	Subcategory	Explanation
Effect	Effect	Does the described trade agreement and its environmental provision have positive, negative, mixed or no or weak effects on business practices or policies?
	Type of effect	What impact of the environmental provision is measured? Impact on business practices, sustainability policies or specific environmental outcomes?
Focus	Micro vs Macro	Does the paper focus on economy/nation-wide/regional effects on regulation (macro) or on effects on the business level (micro)?
	Detailed focus	Does the paper look at a specific field/area (e.g. forests, water and coasts, emissions, social standards, etc.)?
Locus	Locus	Is the paper analyzing bilateral, regional, preferential, free trade or multilateral (WTO) agreements?
	Locus of effect	Is the paper analyzing the impact in developing, middle-income or developed countries? Which regions in particular?
	Location of the researchers	Where are the researchers located?

Source: Authors' own work

The coding category *effect* allowed us to break down the intended focus on the effect of environmental provisions in trade agreements on business practices and policies. To refine this category, we distinguish:

- positive*, indicating a clear positive effect;
- negative*, indicating an environmental deterioration;
- no effect/weak*, indicating that no significant or only a very weak impact was found; and
- mixed effect*, indicating that the effect of provisions is ambivalent for different environmental areas or dependent on enforcement mechanisms.

We furthermore analyzed the literature with the coding category *impact level* to divide between macro (e.g. economy and policies) and micro (e.g. business) effects following environmental provisions in trade agreements. The coding category *focus* helped specifying the focal area of the respective studies, as the papers analyzed a broad range of specific issues from policy changes and technology transfers to air pollution levels and business practices in specific fields like forestry or fishing. Through introducing the coding categories *locus* and *locus of effect* we captured what type of trade agreement, multilateral (WTO/general agreement on tariffs and trade), bilateral, FTAs, preferential trade agreements or regional trade agreements, the articles focused on and which countries or regions the studies analyzed.

While some were region-specific, many studies differentiated between developing countries and developed countries and even though we acknowledge this classification is nowadays contested, coding these categories helped to understand the regional research patterns.

Finally, we introduced the coding category *location of researchers*, to get a clearer picture of the geography of knowledge production in this field. To summarize, the purpose of this set

of categories was to differentiate the variations of effects of environmental provisions in different contexts.

During the analysis of the abstracts, it was obvious that not all papers measure the effect of environmental provisions directly through policy change or new business practices, but some have a more indirect approach of measuring environmental outcomes, like environmental regulation adaption. Although these do not necessarily explain the effects highlighted in the research question, they are relevant for the chain-of-effects and therefore included in a separate category.

4. Findings

The majority of the papers, 19 out of 44, i.e. 43% found a positive effect. Simultaneously, 13 papers, i.e. 30%, found mixed effects, meaning they identified an ambivalent effect on business practices or policies, with differing outcomes for different environmental indicators or multiple factors influencing the effect. Nine papers (20%) found no or only a weak effect, either because the environmental provisions were ineffective due to inter alia noncompliance or because the papers were published only briefly after the implementation of the trade agreement and no claims could yet be made about their impact. The remaining three papers (7%) found a negative effect, indicating environmental degradation. These results indicate that environmental provisions in trade agreements generally seem to have positive effects, while the occurrence of mixed effects and no or only weak effects indicate that the design and enforcement mechanisms remain of vital importance.

Across the publications, some general trends can be identified. The analyzed literature was published over the past 32 years (1992 to mid-2024). When dividing this period into two equally large periods, before and after 2008, one can observe that the findings and publications during the respective period differ. Only 30% (13 papers) of the literature was published before 2008. Out of these 13 early papers, approx. 31% (four) found positive effects, while approx. 46% (six) found no, a weak or a negative impact. From 2008 to 2024, more papers were published (31) and 48% (15) found positive effects, while 19% (six) detected no, weak or negative effects.

These results show that research on the topic is becoming more popular, and that newer research more often finds positive impacts. However, the fact that around one-fifth of the more recent studies find no, a weak or a negative effect leaves ample space for optimization.

4.1 Detailed analysis of micro and macro-level effects of environmental provisions

Differentiating the effects of environmental provisions through *macrolevel effects*, such as changes at the level of the economy or region resulting in regulation for environmental protection or *micro-level effects*, such as businesses picking up activities to manage and reduce their environmental impact lead to the following results: 77% of the included papers (34) took a macro approach, while 23% of the papers (ten) took a micro approach. In terms of environmental effects, some studies targeted specific areas of effect of environmental provisions like the effect on air pollution (three), forests (two) and agriculture (two). Most papers analyzed environmental policy in general (16).

Empirical findings of [Martínez-Zarzoso and Oueslati \(2018\)](#) and [Zhou et al. \(2017\)](#) show that regional trade agreements with environmental provisions have a direct beneficial impact on lowering air pollution, approximated through the concentration of particle pollution from fine particulates (PM_{2.5}), carbon dioxide (CO₂) and nitrogen dioxide (NO₂). [Abman et al. \(2024\)](#) find that while the enactment of regional trade agreements without forest-related provisions leads to a significant 23% increase in annual forest loss, the inclusion of such provisions nearly completely mitigates this adverse effect, demonstrating that forest-related

provisions effectively counteract the negative impact of trade liberalization on forest loss (Abman *et al.*, 2024). Morin *et al.* (2018) similarly show that lower environmental clause counts in the treaties are correlated with higher pollution levels, and vice versa; a higher environmental performance index score is associated with more environmental clauses. Sorgho and Tharakan (2022) find that especially and only climate-related commitments have a significant effect on lowering greenhouse gas emissions which could indicate that the climate-linkage might to be a moderator of the effectiveness of environmental provisions. Furthermore, insights from the literature reveal two mediating factors of the impact of environmental provisions, lobbying (Brandi *et al.*, 2019) and reputation (Di Ubaldo *et al.*, 2022).

In terms of effects on the micro-level perspective, especially the factors of production (inter alia Brandi *et al.*, 2020; Zhang *et al.*, 2022; Di Ubaldo *et al.*, 2022), trade performance of businesses (Maestad, 1998) and the political activity of business interests on the trade and sustainable development nexus (Cezar, 2022) were investigated in more depth. With regard to innovation, and green technology spillovers, the inclusion of environmental provisions is critical for environmental innovation (Li *et al.*, 2024) and creates a mechanism for sustainable technology spillovers and increased carbon productivity (Yuan *et al.*, 2023).

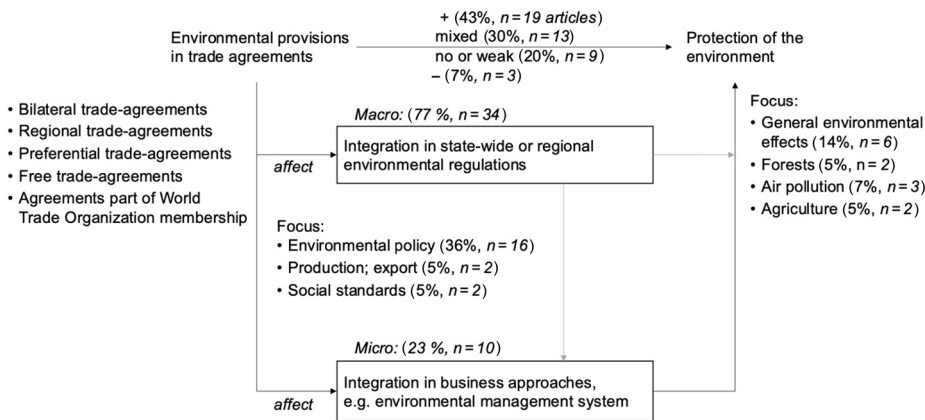
Moreover, and closely linked to environmental provisions, the social dimension was included in the discussion of some contributions (Marx *et al.*, 2016; Garcia, 2022), as provisions for environmental protection are often combined, most prominently in the EUs, with social standards and labor rights provisions. For example, the article by Marx *et al.* (2016) analyzed the effect in the defense of the right to free assembly and collective bargaining, and thus the application of labor rules under the EU-Colombia Trade Agreement.

Although social standards were not a focus of this review, to also include the dimension of social sustainability to a certain extent renders the analysis more holistic. Arguably, the enhancement of labor and social standards might furthermore have an effect on the technique effect, as wages might raise and the demand for cleaner production increases in effect. The separation of the social and environmental dimension of sustainability seems especially artificial in the context of the EU, where all trade agreements since 2009 include trade and sustainable development chapters which combine environmental and social standards and should, therefore, be analyzed jointly (Marx *et al.*, 2016). This insight might guide future research in this field.

Figure 2 provides an overview of the results based on the analytical lens applied and highlights the different levels of impact that the integration of environmental provisions can have.

Against this background, a broad understanding of the different-leveled impact mechanisms and chain effects, as well as the complexity of the effect on different areas of the environment is crucial. However, this is not yet reflected in the academic literature, with none of the contributions applying a comprehensive nexus approach. This might be due to disciplinary or methodological boundaries and highlights the need for more integrated research approaches.

Furthermore, the complexity of bridging several levels, which we outlined as micro and macro, make it particularly challenging to identify causal effects that link international trade agreements with business level actions such as sustainability management approaches. Especially, studies of the potential effects on behavioral change or individual consumer preferences are underrepresented in the literature, although they are covered in the search string. Exploring this connection might be insightful as a multitude of research has shown that changing existing organizational structures (macro and micro) start with the mindset change of individuals (McDonald, 2018).



Source: Authors' own work

Figure 2. Overview of effects of environmental provisions

4.2 Discrepancy studying the effects of developed and developing countries

In terms of different types of trade agreements, around 32% of the literature (14) focuses on FTAs, 25% (11) analyzes environmental provisions in preferential trade agreements and 18% (eight) focuses on WTO law. Less salient are analyzes of regional trade agreements with 11% (five) and bilateral treaties with 9% (four), while two papers analyzed several levels at once.

Against this background, there does not appear to be a significant research gap in relation to a particular form of trade agreements, while FTAs remain the type best studied so far. At the same time, differentiating the effects in developed or developing countries, there is a less equal distribution in the pool of literature.

While the majority of papers (27), 61%, had a mixed *locus* of effect, i.e. they discussed the effect of environmental provisions in trade agreements in which both developing and developed countries were included, only two papers analyzed trade agreements in which developed countries are exclusively affected (Cezar, 2022; Garcia, 2022). At the same time, 16% of the papers (seven) explicitly analyzed the effects in developing countries. When combining this observation with the data about the location of the researchers, it becomes clear that knowledge production about the effects of environmental provisions mainly stems from the Global North, with 32% of the research stemming from the USA (14), 16% from Germany (seven) and 14% from Canada (six).

With no publication prior to 2017, researchers from China contributed six studies (14%) in the past years, with five of them analyzing the *locus* of effects abroad from China. While no contribution from a low-income country was found, the only contribution from a lower-middle country stems from Malaysia (3%).

This implies, at least derived from the literature, that effects in developing countries are assigned more importance, but are almost always researched on from the Global North. In the articles that specifically focus on developing countries, several reasons are given for the relevance of the case selection. It is, inter alia, described that the trade-off of stricter environmental standards in trade agreements would be higher for developing countries (Brandi et al., 2020). This results from the assumption that the comparative advantage of developing countries often lies in resource-intensive economic sectors that are restricted by environmental policies (Anderson and Brooks, 1996).

Furthermore, it is argued that developing countries are more dependent on the rule-based global trading system which could be undermined by environmental provisions (Anderson and Brooks, 1996). Interestingly, it is also argued that their interests and factor endowments would not be adequately considered and reflected in international environmental standards due to a lack of participation in the construction of the regulatory system (Sawhney, 2003). Nevertheless, a bias in this interpretation is possible, as research structures and resources are mostly unequally distributed between the Global North and the Global South and researchers and political actors from the Global North often act as powerful knowledge producers that tend to especially problematize dynamics in the Global South (Jazeel and McFarlane, 2010).

As power is exercised through knowledge production and the ways in which problems are framed and represented in academia and public policy (Bacchi, 2012), we should remain critical about this dominance of knowledge production from high-income countries. Acknowledging power imbalances in the trade and environment nexus, the design of the provisions should be benefitting the interests of developing countries and most vulnerable populations (Brandi and Morin, 2023).

5. Discussion

This analysis provides a systematic review about different directions, levels and areas of effect of environmental provisions in trade agreements. In the following, the findings are discussed critically and implications for future research and policy-making are drawn. First, we discuss surprising insights of temporal and spatial differences of environmental effects. Second, two overarching mediating factors of the connection of environmental provisions on environmental protection are presented, lobbyism and reputation. Third and final, the relevance of enforcement is discussed.

5.1 Temporal and spatial differences of environmental effects

Two types of concern regarding temporal and spatial considerations become apparent in the light of the insights gained from across the sample. First, regarding the temporal dimension, some articles find that environmental provisions do not have to be in force to have effects. The literature highlights that potential environmental regulation integrated in trade agreements often has an impact before rather than after the agreements enter into force (Brandi *et al.*, 2019; Mall, 1998).

Second, in terms of location, this temporal effect seems to be more pronounced in developing countries, some of the studies find (e.g. Yu *et al.*, 2024). These regions are under more pressure to conclude trade agreements and accept provisions as they strive to gain access to markets.

Therefore, environmental provisions tend to reduce harmful exports while increasing environmentally friendly exports from developing countries (Brandi *et al.*, 2020; Block, 2003). This effect is particularly pronounced in developing countries with emerging environmental regulations. This supports the Porter–Hypothesis that trade agreements with environmental provisions can trigger companies to invest in sustainable technologies to increase their competitiveness (Brandi *et al.*, 2020). Higher environmental protection standards induced by provisions in FTAs can thus result in “changed patterns of competitive specialization” (Brandi *et al.*, 2020). At the same time, it is found that high-income countries may use environmental provisions in trade agreements to compensate for the comparative disadvantages resulting from higher domestic regulation levels (Brandi *et al.*, 2019).

Interestingly, while the pollution-haven effect would argue that multinational corporations are more likely to avoid environmental regulation, research finds that multinational companies can successfully contribute to transferring sustainable technologies

and management practices to developing countries (Lang and Ho, 1997). These findings are coherent with Yuan *et al.* (2023), who show that deep environmental provisions in regional trade agreements are an effective way to reduce the leakage of CO₂ from developed to developing countries as they not only constrain the overall CO₂ emission allowances and thus induce innovation efforts for carbon productivity.

Enhancing the depth of environmental provisions and including green technology cooperation also reduces CO₂ emissions through promoting the green transformation of developing economies by creating green technology spillovers (Yuan *et al.*, 2023). Similarly, Presberger and Bernauer (2023) contend that the inclusion of environmental protection clauses in preferential trade agreements and active participation in international environmental agreements likely mitigate both the insourcing and outsourcing of international pollution. Finally, Yu *et al.* (2024) demonstrate that South-North agreements significantly enhance green total factor energy efficiency, suggesting that Southern countries should actively engage in global environmental initiatives and embrace environmental provisions in preferential trade agreements to leverage the spillover of environmental protection technologies from Northern countries.

5.2 Mediating and moderating factors of effects of environmental provisions on environmental protection

We identify two mediating factors of the impact of environmental provisions: lobbyism and reputation, and one potential moderating factor: the inclusion of climate-related provisions.

Lobbyism is relevant when environmental provisions affect industrial sectors linked to high profits, affecting the macrolevel. Reputation might mediate the link of environmental provisions and companies' willingness to address these provisions, affecting the micro-level. Future research might investigate these potential mediators in-depth.

With regard to the mediating factor of lobbyism, we found that regulations concerning industrial sectors with high profits mobilize powerful economic interest groups that oppose environmental provisions (Brandi *et al.*, 2019). In contrast, the protection of the environment and natural resources in remote areas seem to provoke opposition by marginalized groups (Brandi *et al.*, 2019). Especially sweet water protection and air quality seem to be areas which do not create strong lobbies while inter alia fish population protection is difficult due to potential high losses and resistance from the industry (Brandi *et al.*, 2019). Thus, lobbyism seems to have strong effects on the design of environmental provisions and, therefore, impact environmental protection efforts.

With regard to the mediating factor of reputation, stakeholder attention on selected topics seems to be relevant for mediating the effects of specific topics addressed by companies. Businesses seem to focus on sustainability aspects that are highly relevant for stakeholders such as climate change due to potential reputational effects, rather than an intrinsic desire for environmental protection (Di Ubaldo *et al.*, 2022). For example, the implementation of environmental management systems, especially ISO-14001 standards are associated with lowering much discussed greenhouse gas emissions of CO₂ and methane (CH₄) due to trade agreements while there was no decrease in less prominent N₂O and BLC emissions (Di Ubaldo *et al.*, 2022).

As for the potentially moderating effect of the integration of climate-related provisions, Sorgho and Tharakan (2022) convincingly use panel data from 1995 to 2012 to analyze the effect of specific types of environmental provisions in preferential trade agreements and conclude that only climate-related commitments have a significant effect on lowering greenhouse gas emissions, namely, CO₂, methane and NO₂. They find that environmental provisions related to other environmental issues have a negative or no effect on these

emissions. This finding is supported by [Laurens et al. \(2022\)](#), who argue that through leveraging climate provisions in preferential trade agreements, countries can create mutually beneficial outcomes, such as conditioning market access on strong climate action and reducing trade barriers for climate-related goods and services. Therefore, climate-related commitments might act as a moderator in the relation of environmental provisions and their effect on greenhouse gas emissions and thus merit additional scholarly exploration.

5.3 Enforcement

Furthermore, the analysis found that some contributions highlight that enforcement mechanisms are key for the effectiveness of environmental provisions. [Baghdadi et al. \(2013\)](#) argue that agreements entailing specific enforcement mechanisms for environmental provisions in the North American Free Trade Agreement (NAFTA) were more effective than the ones in other EU FTAs. This finding is supported by [Hassan et al. \(2024\)](#), who find that preferential trade agreements with enforceable environmental provisions significantly reduce CO₂ emissions in Asian economies, highlighting the need for policymakers to prioritize preferential trade agreements with robust environmental provisions, clear legal frameworks and enforcement mechanisms.

While not analyzing its empirical effects, [de las Heras \(2023\)](#) shows that the innovative aspect of the EU-New Zealand FTA is its introduction of a more effective trade and sustainable development enforcement mechanism, including the possibility of temporary trade sanctions for noncompliance with the Paris Agreement. In the African context, [Ajibo and Kaime \(2024\)](#) emphasize that the effectiveness of sustainable development clauses in the African Continental Free Trade Area hinges on the design of enforcement mechanisms, particularly a robust peer-review system that ensures compliance. [Yuan et al. \(2023\)](#) equally show that enhancing the depth of environmental provisions reduces CO₂ emissions through green technology cooperation, the enhancement of national environmental governance structures and a higher carbon productivity. This is also true for the compliance with labor standards, as the EU-Colombia Trade Agreement's overall contribution is hampered by the lack of a legally binding enforcement mechanism ([Marx et al., 2016](#)).

The case of the EU-Korea trade agreement shows how the successful integration of enforcement mechanisms for labor standards through a process of “naming and shaming,” pressured the Korean Government into complying with EU standards ([Garcia, 2022](#)). At the same time, [Bechtel and Tosun \(2009\)](#) find that conditional trade agreements, i.e. trade agreements entailing environmental provisions, can at least lead to a *de facto* higher level of environmental protection, while they emphasize that the nonenforcement of these legislative standards is sometimes favorable for both trading partners.

With regard to preferential trade agreements, the enforcement of environmental provisions might be particularly effective because the geographic closeness is not only a factor for advantageous trade relations but also makes environmental protection beneficial for both countries ([Morin and Jinnah, 2018](#)). In terms of the design of enforcement mechanisms, sanctions but also policy dialogue provide an effective approach benefitting environmental protection ([Bastiaens and Postnikov, 2017](#)). Furthermore, it is argued that there are a number of different factors at play rendering environmental protection efforts within WTO agreements ineffective, deducing that the EU should concentrate on regional trade agreements to pursue their environmental agenda and seek swift enforcement ([Poletti and Sicurelli, 2016](#)).

On a micro-level, enforcement effectiveness might be increased through integrating civil society mechanisms that give salience to the demands of various stakeholders and the growing environmental awareness of consumers, thus creating pressure for companies to

deal with environmental issues. Finally, the enforcement effectiveness might be increased by integrating the condition to adopt suitable environmental management systems that are likely to lead to a higher standard of environmental protection (Delmas, 2001; Keysar, 2005).

Some jurisdictions (e.g. EU) have introduced mandatory nonfinancial or sustainability disclosure, esp. for large companies, although in many it is still voluntary (Luque-Vílchez *et al.*, 2023). Over the years, several sustainability reporting standards have been developed, for example, by the Global Reporting Initiative, the International Sustainability Standards Board, Sustainability Accounting Standards Board or the European Financial Reporting Advisory Group (Luque-Vílchez *et al.*, 2023). Such frameworks, which may differ in methodology and purpose (Ali *et al.*, 2023), are intended to help companies provide structured disclosure information regarding their sustainability impacts (Zharfpeykan and Akroyd, 2023). However, sustainability disclosures and reporting standards are not without criticism, which include selective and voluntary reporting, comparability issues between reporting standards as well as greenwashing (Ali *et al.*, 2023; Zharfpeykan and Akroyd, 2023; Luque-Vílchez *et al.*, 2023).

6. Conclusions

This systematic literature review focused on the promise to greening global trade through integrating environmental provisions into trade agreements. To generate a holistic perspective that links the macro and micro-level, the review included studies that analyze the effects of the provisions on the environmental performance of businesses as well as on the public economic or political level. The findings indicate that the integration of environmental provisions into trade agreements is generally associated with higher levels of environmental protection, while a number of contributions nevertheless indicated a lack of impact. As such, our study deduces that the general existence of environmental provisions in trade agreements is favorable to their absence and that their absence can *inter alia* lead to less environmental innovation (e.g. Li *et al.*, 2024). At the same time, their mere presence is not sufficient but their design and enforcement remain crucial. The enforcement mechanism design of environmental provisions is a promising approach for both strengthening the participation of the civil society and increasing the effectiveness of the provisions. This reflects that the environmental, economic and social dimensions of sustainability are inherently interconnected and that the separation of these dimensions is outdated. Consequently, future research on greening trade agreements should adopt a multidimensional perspective on sustainability. As a result of our holistic lens, we found that only a small number of papers directly focused on the link between environmental provisions and business practices, for example, incorporating sustainability management approaches, while more recent studies seem to bridge this gap and imply optimistic results with regard to green technology transfer. Implications of this study are presented in the following subchapters and as an overview in Table 3.

With regard to limitations, one constraint of our analysis stems from the fact that an unambiguous assessment of the impact of environmental provisions is difficult to achieve, as many contributions in the literature show mixed effects and, due to the complexity of the topic, a certain extent of methodological biases in quantifying the effect must be assumed. A further limitation is the focus on environmental provisions as a key search term which subsequently excludes articles that focus on a subsections and themes of environmental provisions such as water or biodiversity and refrain from using the term “environmental provisions” in their title.

6.1 Implications for research

Given that our research addresses multiple links within a potential chain-of-effects, it provides valuable opportunities for future research to conduct more in-depth analyses of

Table 3. List of implications for research and practice

Implications for further research	Implications for practice
Analyzing which specific types of EPs, such climate provisions, are most effective	Ensuring depth of EPs, especially through effective enforcement mechanisms that integrate civil society monitoring mechanisms
Determining what types of proxies are most suitable to holistically capture the level of environmental mitigation or degradation influenced by EPs	The pollution haven effect can be countered through the integration of effective EPs into trade agreements
Bridging the gap between the macro policy level and business practices through analyzing the effects of EPs on businesses in more detail, including different sustainability and environmental management approaches	The agency and perspective of researchers and policymakers from the global South has to be strengthened, while green spillover effects seem to be a promising impact of EPs
Diversifying research on greening trade through supporting research in global South countries and more diverse research cooperation	Businesses that embrace green technologies can benefit from lobbying for EPs
Conducting a quantitative meta-analysis to aggregate the results, making use of the TREND database	Integrating EPs fosters green innovation dynamics globally, thus holding benefits for businesses and citizens alike
Researching the environmental impacts of increasing digital trade flows and the effects of digital trade provisions on the environment	

Note: EPs = environmental provisions in international trade agreements
Source: Authors' own work

specific effects. This might entail research on which specific types of environmental provisions in trade agreements, like climate provisions, influence domestic policy processes, businesses or environmental outcomes directly in an effective way and how time effects influence the effectiveness of environmental provisions in trade agreements.

Future research might explore what types of proxies (e.g. emission levels, energy efficiency and number of domestic environmental regulation policies adopted) are most suitable to capture the level of environmental mitigation or degradation when analyzing the effect of environmental provisions, as, for example, ISO-14001 standards decreased CO₂ and CH₄ but not N₂O and BLC (Di Ubaldo *et al.*, 2022) and only a broad lens was adequate to measure this. This could lead to research on which specific environmental indicators should be integrated into environmental provisions to ensure their effectiveness. But also exploring tools that measure contributions to sustainability, beyond the reduction of negative impacts such as greenhouse gas emissions (Dijkstra-Silva *et al.*, 2022; Kuehnen *et al.*, 2022; Kuehnen *et al.*, 2019) merits further attention, just as research on how different types of sustainability and environmental management approaches could be integrated into environmental provisions to bridge the gap between the macro and the micro-level.

With regard to the academic landscape, we find a strong dominance of research stemming from the Global North, paralleled by a lack of studies from researchers from institutions in the Global South, which creates a bias that is likely to limit relevant insights. We, therefore,

advocate for more funding for researchers in Global South countries on this topic or at least a more diverse composition of research groups, including international research cooperation.

Furthermore, while we chose the methodological approach of a systematic literature review, conducting a meta-analysis and taking a more quantitative focus to aggregate the results could provide interesting insights. This research could benefit from working with new, accessible data from the TREND database (Sorgho and Tharakan, 2022) which is a free, digital database provided by the Laval University in Canada. Our analysis has seen an uptake in recent studies that draw on these types of databases.

With the recent speed of technological innovations, researching the role of emerging digital technologies to track environmental impact on different regions and states alongside the increasing global supply chains covered under different trade agreements could provide an interesting angle and provide novel insights in the future. This can be linked to Li *et al.* (2024), who find that digital trade provisions in regional trade agreements can effectively reduce CO₂ emissions in member states by enhancing trade efficiency, promoting service-oriented industries, optimizing energy use in manufacturing and driving technological innovation, all of which collectively lower emissions (Li *et al.*, 2024) See Appendix.

6.2 Implications for practice

Our study offers significant implications for practice, with distinct considerations for both policymakers and the private sector. In terms of policy, our study shows that, in accordance with Yuan *et al.* (2023), the depth and details of trade agreements can vary considerably, with more specific provisions generally leading to better results. Furthermore, the enforceability to ensure incentives for macrolevel transition toward a higher level of sustainability of economies remains crucial, with civil society monitoring elements being a promising tool to ensure more effectiveness. A general insight for all policymakers who aim to counter the pollution haven effect is that environmental provisions can function as mitigators of negative environmental impact of trade (Presberger and Bernauer, 2023), which is of high relevance for economies that strive for a globally just and green transition.

Policymakers in the Global South can profit from the insight that academic knowledge on the trade-environment nexus mostly stems from the Global North and thus potentially entails a bias, which they could problematize and advocate for integrating their local perspectives. However, countries in the Global South can indeed benefit from integrating effective environmental provisions, as they demand more transformative changes from them, yet also offer opportunities for green spillover effects (Yu *et al.*, 2024).

For businesses, our study shows that, to level the playing field, companies that work with green technologies can benefit from advocating and lobbying for the inclusion of environmental provisions in trade agreements. This might prove especially beneficial for corporations in emerging markets without sufficient environmental regulation. With regard to innovations, our study indicates that these can spread more globally through environmental provisions, therefore, bringing environmental benefits to businesses and citizens alike.

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Appendix

Table A1. List of publications with effect, locus, locus of effect and location(s)

Author(s)	Year	Effect	Locus	Locus of effect	Location(s)
Schoenbaum, T.	1992	Positive	GATT/WTO	Mixed	UK, USA
Magraw, D.	1994	Positive	FTAs	Mixed	USA
Spalding, M. J.	1997	No effect/weak	FTAs	Mixed	USA
Marchak, P.M.	1998	Negative	FTAs	Mixed	CA
Mall, B.	1998	No effect/weak	FTAs	CL, MX	USA
Maestad, O.	1998	Positive	GATT/WTO	Mixed	NO
Ervin, David E.	1999	Mixed	GATT/WTO	Mixed	USA
Mann, H.	2000	No effect/weak	FTAs	Mixed	CA
Yang, W.	2002	Positive	GATT/WTO	CN	CN
Hochstetler, K.	2003	No effect/weak	FTAs	Developing c.	UK, US
Block, G.	2003	No effect/weak	FTAs	Mixed	USA, CA
Sawhney, A.	2003	Mixed	GATT/WTO	Developing c.; Asia	IN
Green, A.	2005	Mixed	GATT/WTO	Mixed	CA
Lee, E.S.	2008	Positive	GATT/WTO	Mixed	KR
Bechtel, M.M.;	2009	No effect/weak	Bilateral	Mixed	CH, DE
Tosun, J.					
Jinnah, S.;	2011	Positive	FTAs	Mixed	USA
Kennedy, J.					
Jinnah, S.	2011	Positive	Bilateral	PE	USA
Baghdadi, L. <i>et al.</i>	2013	Positive	Mixed	Mixed	TN, DE, UK
Shafiee, Y.A.;	2016	Positive	GATT/WTO	Developing c.; MY	MY
Yeon, A.L.					
Nuñez, Paul	2016	Mixed	FTAs	Mixed	USA
Marx, A. <i>et al.</i>	2016	No effect/weak	FTAs	Developing c.	NL
Poletti, A.;	2016	Mixed	PTAs	Developing c.	IT
Sicurelli, D.					
Bastiaens, I.;	2017	Positive	PTAs	Developing c.	US, AU
Postnikov, E.					
Zhou, L. <i>et al.</i>	2017	Positive	RTAs	Mixed	CN
Martínez-Zarzoso;	2018	Positive	RTAs	Mixed	DE, FR
Oueslati					
Koo, M.G.; Kim,	2018	Mixed	FTAs	East Asian c.	KR
S.					
Morin, J.-F.;	2018	No effect/weak	PTAs	Mixed	USA, CA
Jinnah, S.					
Brandi, C. <i>et al.</i>	2019	Positive	PTAs	Mixed	DE, CA
Peinhardt, C. <i>et al.</i>	2019	Negative	Bilateral	PE	USA
Pacheco Restrepo,	2019	Mixed	Bilateral	PE	DE
Y.V.					
Brandi, C. <i>et al.</i>	2020	Positive	PTAs	Mixed	DE, CA
Heyl, K. <i>et al.</i>	2021	No effect/weak	Mixed	Mixed	DE
Garcia, M.J.	2022	Mixed	FTAs	Developed c.	UK
Cezar, R.F.	2022	Mixed	PTAs	Developed c.	BR
Zhang, Y. <i>et al.</i>	2022	Mixed	PTAs	B&R c.	CN
Di Ubaldo <i>et al.</i>	2022	Positive	FTAs	Mixed	UK
Sorgho, Z.;	2022	Mixed	PTAs	Mixed	CA, FR, BE
Tharakan, J.					
Yuan <i>et al.</i>	2023	Positive	RTAs	Mixed	CN

(continued)

Table A1. Continued

Author(s)	Year	Effect	Locus	Locus of effect	Location(s)
Hassan <i>et al.</i>	2024	Mixed	PTAs	Asian c.	PK, SA
Li <i>et al.</i>	2024	Negative	RTAs	Mixed	CN
Presberger; Bernauer	2023	Positive	PTAs	Mixed	CH
Yu <i>et al.</i>	2024	Positive	PTAs	Mixed	CN
Konishi <i>et al.</i>	2023	Mixed	FTAs	Developing c.	USA, JP
Abman <i>et al.</i>	2024	Positive	RTAs	Mixed	USA

Notes: Australia (AU); Belgium (BE); Brazil (BR); B&R c. (countries located along China's Belt and Road Initiative's route, especially South and Central Asian and East African countries); Canada (CA); Switzerland (CH); Chile (CL); China (CN); Germany (DE); France (FR); India (IN); Italy (IT); Japan (JP); South Korea (KR); Mexico (MX); Malaysia (MY); The Netherlands (NL); Norway (NO); Peru (PE); Pakistan (PK); Saudi Arabia (SA); Tunisia (TN); United Kingdom (UK); United States of America (USA); General Agreement on Tariffs and Trade (GATT); World Trade Organization (WTO); Free Trade Agreements (FTAs); Preferential Trade Agreements (PTAs); Regional Trade Agreements (RTAs)

Source: Authors' own work

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