

The European Union's CBAM: averting emissions leakage or promoting the diffusion of carbon pricing?

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Michael A. Mehling^a, Geoffroy Dolphin^b and Robert A. Ritz^c

Abstract

Adopted in 2023, the Carbon Border Adjustment Mechanism (CBAM) is a significant component of the European Union's ambitious decarbonization strategy under the European Green Deal. This working paper questions the CBAM's effectiveness in achieving its stated objective, prevention of carbon leakage, but proceeds to document its impactful role in accelerating the global diffusion of carbon pricing. Empirical evidence for carbon leakage remains sparse, and implementation challenges would limit the capacity of the CBAM to counteract leakage even where it occurs. Nonetheless, the CBAM has already demonstrated a powerful spillover effect by incentivizing the acceleration of carbon pricing roadmaps across EU trading partners, suggesting that trade-related climate measures can effectively encourage global climate action. As the EU navigates the complexities of operationalizing the CBAM, it must balance several tradeoffs to maintain this important spillover effect. If successful, the CBAM could catalyze a virtuous cycle of carbon pricing adoption, reinforcing its pivotal role in the EU's toolbox to manage the environment-trade nexus.

Keywords CBAM, carbon pricing, carbon leakage, environment-trade nexus, European Union

JEL Classification F42, H23, Q58

Contact	mmehling@mit.edu 77 Massachusetts Ave., E19-411F, Cambridge, MA, 02139, USA
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^a Center for Energy and Environmental Policy Research, Massachusetts Institute of Technology (MIT), Cambridge, MA, USA; School of Law, University of Strathclyde, Glasgow, UK; ^b European Department, International Monetary Fund (IMF), Washington, DC, USA; ^c Energy Policy Research Group (EPRG), Judge Business School, Cambridge University, Cambridge, UK

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1. Introduction

The European Union's (EU) Carbon Border Adjustment Mechanism (CBAM) has garnered wide attention as a companion policy to domestic carbon pricing under the European Union Emissions Trading System (EU ETS). It is an essential element of the ambitious decarbonization strategy set out in the European Green Deal, a transformative agenda first announced by Ursula von der Leyen in July 2019 during a speech outlining her political guidelines after being nominated to lead the European Commission (von der Leyen, 2020), and is critical to the delicate political balance of interests underlying her first presidency.

Long shunned by the political establishment in Brussels and Member State capitals as a way to manage the challenging nexus between trade and the environment, the CBAM heralds a notable shift in EU strategy, reflecting the adoption of a more confrontational stance in a geopolitically and economically fragmenting world (Hervé, 2022; IMF, 2023). It is also emblematic of a broader trend that has seen the EU leverage conditional access to its markets in order to secure economic competitiveness while extending social and environmental standards to trade partners (Scott, 2014), a phenomenon often described as the 'Brussels Effect' (Bradford, 2020).

Surprisingly, however, the stated objective of the CBAM – preventing the risk of carbon leakage, that is, the relocation of emissions to foreign jurisdictions as a consequence of differences in climate policy ambition – is a problem for which the empirical evidence, to date, has remained limited (Caron, 2022). What is more, the complexities of CBAM implementation, coupled with regulatory gaps, political and legal vulnerabilities, and potential circumvention opportunities, all raise questions about its ability to effectively address leakage were it to ever occur (Bushnell, 2024).

One of the less foreseen consequences of the CBAM, meanwhile, has been its role in accelerating the adoption of carbon pricing around the globe. At first glance, numerous countries with trade exposure to the EU have expedited or expanded their carbon pricing strategies in response to the CBAM (Clausing & Wolfram, 2023; Pauw et al., 2022; World Bank, 2022). Although not officially intended, this observed dynamic has been described as a promising 'stepping stone' towards establishing a global carbon price (Delbeke et al., 2023).

Following over a decade of hesitation about the use of border carbon adjustments (BCAs) within the EU institutions, the abrupt embrace and rapid advancement of the CBAM offers a valuable case study of the EU's increasing turn to unilateral tools to manage the environment-trade nexus (De Ville et al., 2023). This working paper thus contributes to the growing body of scholarship studying the complex relationship between international trade and the environment, and EU efforts to better integrate trade and environmental policies and practices in order to further their respective objectives.

Drawing on the foregoing discrepancy between stated goals and observed effects, this working paper applies an analytical lens that frames the CBAM as a policy ‘output’ of the EU’s attempt to manage the environment-trade nexus, and thus as a measure of EU institutional effectiveness, that is, the degree to which EU legislation has been able to integrate environmental policy and trade objectives; it then contrasts this policy ‘output’ with its likely intended and unintended outcomes, which serve as a measure of impact effectiveness, that is, of the ability to actually advance policy objectives via ‘tangible consequences’ (Skjærseth & Wettestad, 2002, p. 106).

What this working paper seeks to ascertain, thus, is whether the CBAM is a suitable instrument to advance its stated objective of mitigating the risk of leakage, one of the oldest and most persistent problems identified at the environment-trade nexus (Markusen, 1975); or if, instead, its main contribution to improved alignment of trade and environment policies will ultimately be the diffusion of carbon pricing, an unstated objective that nonetheless can contribute to greater convergence of environmental policies and thus reduced distortions of international trade. In answering the foregoing question, it highlights the role of indirect policy outcomes and their contribution to the real-world impact of EU climate and trade policy.

To answer this question, the working paper begins by tracing the historical development of the CBAM, describing its stated objectives and how these have shaped its policy design as an expression of the EU’s institutional effectiveness. It then proceeds to question the potential impact effectiveness of the CBAM based on the scarce evidence of carbon leakage to date and the difficulties in addressing it, before contrasting that with the already observed diffusion of carbon pricing across EU trade partners. What follows is a brief conclusion that discusses the promise and pitfalls of influencing extraterritorial policy developments to manage the environment-trade nexus, and presents policy implications of the findings.

2. From reluctant stakeholder to policy champion: the EU’s pivot to the CBAM

Historically, the concept of BCAs can be traced back to early theoretical literature on the potential cross-border ‘spillover effects’ of divergent levels of domestic environmental policy ambition mediated through international trade. An idea first proposed then, of unilaterally extending domestic policy constraints to imported goods and providing relief from those constraints for exported goods, was inspired by a long tradition of border tax adjustments (BTAs). In the international trade of goods, these have been successfully deployed for centuries to implement the ‘destination principle’, according to which fiscal burdens should be imposed where goods are ultimately consumed to ensure trade neutrality (GATT, 1970; Pirlot, 2017).

It did not take long for this idea to find its way into the climate policy debate as a potential tool to address the competitiveness impacts of uneven carbon constraints, such as carbon pricing. In the early 1990s, as both the EU and the United States considered deployment of fiscal measures to mitigate greenhouse gas emissions, discussions also extended to the adoption of a BCA on certain categories of goods (Grubb, 1990; Jackson, 1993; Pitschas, 1995). While these proposals ultimately faltered, both sides of the Atlantic have since witnessed a periodic resurgence of calls to adopt a BCA in order to level the economic playing field between domestic and foreign industries.

For Europe, the idea only gained real momentum when the U.S. decided to withdraw from the Kyoto Protocol – at the time the main venue of meaningful climate cooperation – in 2001.

Faced with the prospect of pursuing mitigation efforts without participation by the then largest greenhouse gas emitter, several stakeholders, most notably the French government, introduced the idea of a BCA to enable growing climate policy ambition in the EU while holding free-rider countries, such as the U.S., accountable and compelling them to shoulder their fair share of the climate policy burden (Biermann & Brohm, 2004; NEF, 2003; Wiers, 2008).

Still, despite multiple attempts to garner political traction for BCAs, including legislative language drafted by the European Commission in 2007 as well as amendments proposed in the European Parliament in 2016, actual progress remained elusive (Mehling et al., 2019). Influential voices in Brussels and the Member States feared the potential ramifications for international climate negotiations and relations with trading partners, including the prospect of legal challenges before the World Trade Organization (WTO). An earlier attempt to extend European carbon pricing to international aviation had already elicited substantial diplomatic fallout, moreover, culminating in a political retreat that served as a cautionary tale (Hartmann, 2013).

Again, it was a set of foreign policy decisions by the U.S. – coupled with an evolving geopolitical landscape – that afforded new purchase to the notion of an EU BCA. Following his election in 2016, President Donald Trump both withdrew his country from the Paris Agreement, the successor agreement to the Kyoto Protocol (Mehling & Vihma, 2017), and advanced his protectionist vision for international trade, imposing substantial tariff increases on a number of strategically important goods (Daugirdas & Mortenson, 2018). As affected trade partners, including the EU, countered with retaliatory measures, frayed trade relations declined into open conflict, exacerbating the existing gridlock at the WTO. International climate diplomacy, meanwhile, had already delivered the Paris Agreement (Falkner, 2016), mitigating concerns that a BCA might disrupt that sensitive negotiating process.

All this set the stage for Ursula von der Leyen to include a ‘Carbon Border Tax’ in her political guidelines presented to the European Parliament in July 2019. Since then, various converging factors, including accelerating EU climate leadership in a context of nationally determined and increasingly heterogeneous climate action, growing competitive pressures in global markets, external shocks such as the COVID-19 pandemic and armed conflict in Ukraine, and a broader trend towards expanded use of unilateral sanctions and other restrictions to counter unintended consequences of globalization (Heydon, 2023; Roberts & Lamp, 2021), have accelerated a ‘geopolitical turn’¹ in EU policy-making (McNamara, 2023) that secured political support for the CBAM as it progressed from proposal to implementation.

Following its first announcement in the summer of 2019, the legislative journey of the CBAM was comparatively swift. Later that year, a communication setting out the indicative timeline for different elements of the European Green Deal envisioned a legislative proposal by 2021 (European Commission, 2019b). In early 2020, the European Commission conducted an inception impact assessment, followed by a public consultation (European Commission, 2020a, 2020b). A resolution adopted by the European Parliament in early 2021 supporting the idea of a CBAM (European Parliament, 2021) was then followed by a formal legislative proposal from the European Commission in July 2021 (European Commission, 2021d).

¹ It is worth noting that President von der Leyen has herself branded her Commission a ‘geopolitical Commission’ (European Commission, 2019a), with EU trade policy since becoming more assertive in express support of EU geopolitical interests (European Commission, 2021b).

By late 2021, the CBAM proposal had been referred to the Committee on Environment, Public Health and Food Safety in the European Parliament, whose amendments were adopted by a plenary vote in June 2022 (European Parliament, 2022). Around the same time, in March 2022, the Council of the European Union defined its general approach in March 2022 (Council of the European Union, 2022). With both legislative bodies having clarified their positions, interinstitutional negotiations – the ‘trilogue process’ – was able to begin, resulting in a provisional agreement in December 2022. A formal vote early in 2023 allowed the final act to be signed in May 2023, with publication in the Official Journal on 16 May 2023 (European Union, 2023). The CBAM became law the next day.

Now that it is in force, the CBAM is meant to successively replace free allocation of emission allowances as the primary safeguard against emissions leakage under the EU ETS. To enable that transition, it extends the carbon price applied under the EU ETS to the emissions associated with imports of six product categories – cement, iron and steel, aluminium, fertilizer, electricity, and hydrogen – based on emissions data from foreign producers or default assumptions about the carbon intensity of these goods. In a first step, since October 2023, importers have been required to declare the emissions embedded in covered goods entering the customs territory of the EU following reporting rules for the current ‘transitional period’ (European Commission, 2023).

Such declaration entails calculating the emissions released during the production of imported goods, including indirect emissions from the production of electricity consumed during the production process. From January 2026, importers will additionally need to obtain validation of this emissions declaration by an independent accredited verifier, and purchase and surrender certificates each year in an amount equal to the declared emissions from the preceding year, with certificates priced at the same level as EU ETS allowances. Initially, the payment obligation will be prorated to reflect the remaining share of allowances allocated for free to EU producers, and gradually increase as free allocation is phased out until the end of 2034 (Meadows et al., 2024; Mehling & Jakob, 2024).

So far, the policy output related to the CBAM has been prolific, evidencing an increased focus on the nexus of trade and the environment inside the EU. Going forward, this output will continue to grow, as the European Commission elaborates a number of implementing and delegated acts to operationalize the CBAM Regulation along with guidance documents, reporting templates, and training materials (European Commission, 2024a). Already, the EU can thus be credited with a degree of institutional effectiveness for having mustered the necessary resources and aligning very divergent stakeholders to bring this legislative file to a successful conclusion within a tight timeline and notwithstanding adverse external circumstances.

Whether the institutional effectiveness shown by the EU in passing the CBAM will be matched by the desired outcomes in the real world and its policy outputs will lead to improved policy coherence at the environment-trade nexus has yet to be established. Because the CBAM has only recently entered into effect, with a transitional period that will only progress to definitive implementation including payment obligations by 2026, it would be premature to evaluate its impact effectiveness at this point. Still, by identifying its policy objectives and the accompanying challenges, the next section asks whether the CBAM as currently designed is

equipped to meet the main criterion for impact effectiveness: ‘tangible consequences affecting the physical problem at hand’ (Skjærseth & Wettestad, 2002, p. 106).

3. Carbon leakage: Addressing a contested problem with a contested tool

3.1 Carbon leakage: an unsubstantiated problem?

In its Article 1(1), the CBAM Regulation states its policy objective as follows: ‘[t]his Regulation establishes a carbon border adjustment mechanism ... in order to prevent the risk of carbon leakage’ (European Union, 2023, Art. 1(1)). It goes on to state that the CBAM thereby aims at ‘reducing global carbon emissions and supporting the goals of the Paris Agreement, also by creating incentives for the reduction of emissions by operators in third countries.’ From this provision, it already becomes clear that the CBAM does not pursue a single, uniform objective, but several policy outcomes that may not always be mutually consistent (Pirlot, 2022).

Still, based on this provision and language in other parts of the CBAM Regulation, notably in the preamble, and considering its designated function as a replacement for existing leakage safeguards under the EU ETS, the prevention of carbon leakage ostensibly takes precedence over other policy goals. As the preamble of the CBAM Regulation further clarifies, ‘[c]arbon leakage occurs if, for reasons of costs related to climate policies, businesses in certain industry sectors or subsectors transfer production to other countries or imports from those countries replace equivalent products that are less intensive in terms of greenhouse gas emissions’ (European Union, 2023, Preamble, Rec. 9).

Carbon leakage has found extensive treatment in the academic literature, which has identified three leakage channels (Ward et al., 2015). Leakage related to trade arises when climate policy increases production costs, eroding comparative advantage. Known as ‘direct leakage’, it occurs through an operational (short-term competitiveness) and an investment (long-term competitiveness) channel (Pethig, 1976; Siebert, 1977). The third channel, ‘indirect leakage,’ pertains to global energy markets, where reduced fossil fuel demand in regions with stringent carbon constraints lowers global prices, increasing consumption elsewhere (Bohm, 1993).

From its own definition in the preamble, the CBAM is only intended to address the first two channels involving relocation of industrial production. It does little to change relative fuel prices, and is thus unable to avoid leakage across the third channel related to energy markets (Fischer & Fox, 2012), which some research suggests may be the most consequential of the three channels (Burniaux & Martins, 2012); in effect, because the introduction of the CBAM allows phasing out free allocation and thus increasing the cost of fuel consumption in the European Union, it could even accelerate the displacement of energy demand and related emissions to third countries.

Emissions leakage undermines the benefits of unilateral climate action because some or all of the emissions reduced domestically shift location and occur elsewhere. Extreme cases could even see a net increase in global emissions if emissive activities shift to regions with higher carbon intensity (Babiker, 2005; Hoel, 1991). While emissions relocation has occurred – an estimated 20-25% of global greenhouse gas emissions are associated with goods traded across borders (Hasanbeigi & Darwili, 2022) – it is owed less to climate policy constraints than

to offshoring of manufacturing capacities due to more favourable factor endowments, such as lower labour and energy costs (Grubb et al., 2022).

Evidence of actual carbon leakage induced by uneven climate policies remains sparse, largely due to the modest ambition of past climate action (Aldy & Pizer, 2015; Caron, 2022; Dechezleprêtre & Sato, 2017). For the EU ETS, research suggests that low carbon price levels during the 2000s and 2010s, combined with measures to protect industry competitiveness, such as free allocation of emission allowances and compensation mechanisms (Antoci et al., 2022), have limited significant leakage effects to date (Branger et al., 2016; Dechezleprêtre et al., 2023; Healy et al., 2018; Naegele & Zaklan, 2019; Verde, 2020). As climate policies become more stringent, the risk of carbon leakage could increase (Carbone & Rivers, 2017), but it remains largely hypothetical for now. In the words of two researchers evaluating the case for the EU CBAM, '[t]here is little in the way of strong empirical evidence that would justify a carbon-adjustment measure' (Zachmann & McWilliams, 2020, p. 1).

3.2 Adjusting carbon at the border: fit for purpose?

Not only that, even if emissions leakage were to become more pronounced as existing safeguards are phased out, the effectiveness of the CBAM in preventing it would be far from guaranteed. Although conceptually appealing as a means to level uneven climate policies, the CBAM introduces substantial uncertainties in its practical implementation. For one, the political economy of the CBAM is premised on a delicate balance of underlying interests (Buylova et al., 2022; Jakob, 2023) that could be destabilized as emerging distributional effects, rising diplomatic tensions, and even the possibility of judicial challenge manifest themselves once the CBAM is operationalized.

Domestically, divergent stakeholder preferences and inflationary impacts, which, as these pass through the value chain, will also increase consumer prices, could weaken political support for the CBAM among key stakeholders and the European public. A number of concerns regarding coverage of EU exports (Evans et al., 2021), indirect emissions and downstream goods have already incited criticism from EU industry associations (AEGIS Europe, 2023; BusinessEurope, 2021). In its own impact assessment, for instance, the European Commission estimated that downstream producers of products including household appliances, vehicles and food would be 'worse off under the CBAM as they face higher input prices' (European Commission, 2021c, p. 62). It likewise expected the CBAM to have a regressive effect, which, although modest, could become a liability if the costs of climate policy become a polarizing issue in electoral politics (Driesen et al., 2024).

Internationally, the CBAM is already unpopular among many European trading partners and viewed as a protectionist measure that benefits European industry at the expense of its foreign competitors (Bergin et al., 2021; Øverland & Sabyrbekov, 2022). Least developed countries (LDCs), in particular, could suffer welfare impacts from limited market access, adding an equity dimension to the debate (Eicke et al., 2021; Magacho et al., 2023). Instead of allocating revenue collected under the CBAM to affected countries, which would help alleviate some of these concerns (Perdana & Vielle, 2022), the EU has proposed retaining it to cover administrative costs and help repay debt incurred during the pandemic under the NextGenerationEU recovery instrument (European Commission, 2021a).

International misgivings about the CBAM threaten to spill over into sensitive negotiating processes, potentially stalling progress on multilateral cooperation. During the 28th Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) in December 2023, for instance, a coalition of major emitters – Brazil, South Africa, India and China (‘BASIC’) – requested that ‘unilateral and coercive’ trade measures such as the CBAM be included in the summit agenda, noting that these jeopardize trust and ‘violate the objectives and principles of the Convention and its Paris Agreement, and seriously undermine multilateral cooperation’ (Brazil, 2023).

Likewise, several countries have raised questions about the CBAM in international trade deliberations, with a group of developing countries issuing a declaration at the 13th Session of the WTO Ministerial Conference in February 2024 that called on countries to ‘refrain from unilateral protectionism disguised as environmental measures’ (WTO, 2024, p. 2).² India has even announced its intention to pursue judicial proceedings before the WTO (Suneja, 2024), and while the EU has consistently maintained that the CBAM complies with its international obligations, prominent scholars have cautioned that a breach of treaty obligations – and thus a protracted and costly trade conflict – might nonetheless be difficult to avoid (Bacchus, 2021; Quick, 2020).

Political and legal risks are not the only headwinds faced during CBAM implementation. Technical complexities and capacity constraints, including a shortage of accredited emission verifiers, also threaten to increase the compliance burden on importers and foreign producers (Böhringer et al., 2022; Siskos & Saush, 2023). Already, the first reporting cycle revealed significant headwinds, with technical difficulties in the reporting infrastructure necessitating a deadline extension and a small fraction only of expected reports submitted by the initial deadline suggesting extensive underreporting (European Commission, 2024b; Hancock, 2024). If the EU ETS took over a decade of policy reforms to secure robust functioning (Wettstad & Jevnaker, 2016), it stands to reason that an equally or even more complex instrument such as the CBAM will also require years of continued improvement before it operates as desired.

Regulatory loopholes and the risk of circumvention through trade adjustments could further undermine the impact effectiveness of the CBAM. Altogether, BCAs are vulnerable to circumvention through adjusted trade flows in the form of resource shuffling and transshipment or strategic policy responses, such as export subsidies to restore the competitive advantage of affected producers. Substitution effects in third countries could entail production shifting from sectors subject to a BCA to those excluded from its scope (Golombek et al., 1995; Hoel, 1996), producer reorganization to divest from polluting facilities, or product modification and processing to exceed covered value chain thresholds (Zachmann & McWilliams, 2020).

While jurisdictions implementing BCAs can try to identify and counteract such circumvention practices, the empirical record of economic and financial sanctions suggests that evasive action remains a persistent challenge (Demarais, 2022). Similarly, trade remedies aimed at correcting international trade distortions, such as countervailing and antidumping

² Similarly, China has proposed launching a process of ‘multilateral discussions on the trade aspects and implications of certain environmental measures’ – highlighting that such measures ‘have given rise to controversies’ and ‘[d]ifferent perceptions may exist’ – through the WTO Committee on Trade and Environment (WTO, 2023, p. 1).

duties, are routinely circumvented by their targets (Forganni & Reed, 2019). Research on the first operational BCA, the Californian inclusion of imported electricity in its emissions trading system, suggests widespread deployment of avoidance practices, essentially negating the environmental benefits from including electricity imports (Bushnell et al., 2014; Caron et al., 2015; Pauer, 2018).

It is telling that the European Commission, in its impact assessment of the CBAM, acknowledged that circumvention practices such as resource shuffling stand to lower the carbon costs faced by importers and ‘undermine the carbon leakage protection which the CBAM provides, without leading to a decrease of global emissions’ (European Commission, 2021c, p. 29). Still, despite citing an estimate that the scale of resource shuffling for covered goods could reach up to 80%, it opted to disregard such evasion in its economic modeling of anticipated effects because of the attendant uncertainties.³ More recent research has even suggested that resource shuffling, coupled with the resulting increase in EU commodity prices, may actually help foreign producers reap greater benefits from the CBAM than their EU counterparts (Assous et al., 2024).

In effect, the CBAM has to confront two sets of challenges. One is that a variety of legal, political, and regulatory constraints prompt its practical implementation to fall short of an idealised ‘textbook’ policy design. Another is that the introduction of the EU CBAM goes in tandem with a phase-out of freely allocated emissions allowances; as a result, the effectiveness of the CBAM in combatting carbon leakage will be judged relative to the track record of the previous policy regime of free allocation. Together, these two factors imply that the CBAM may not be as powerful, in practice, as a cursory analysis of its benefits might suggest.

Overall, thus, the foregoing implementation challenges raise serious questions about the ability of the CBAM to address emissions leakage, and thus about its impact effectiveness in terms of achieving stated policy objectives. Commentators have gone even further, suggesting that the CBAM might ‘hinder rather than help EU climate policy’ (Zachmann & McWilliams, 2020, p. 1), prove ‘unworkable in practice’ (Koester et al., 2021, p. 1), and ‘hurt industrial manufacturers based in Europe more than those based in third countries’ (Assous et al., 2024, p. 5). What these assessments do not, however, consider is another important outcome of the CBAM, namely its already manifest ability to spur adoption of carbon pricing in third countries. That indirect impact – along with its promise and pitfalls – is explored in the next section.

4. Global Diffusion of Carbon Pricing: The real impact of the CBAM?

4.1 How the CBAM is accelerating global uptake of carbon pricing

Although the CBAM Regulation mentions other motivations alongside the primary objective of leakage prevention, such as supporting the goals of the Paris Agreement, none of the stated goals extend to influencing foreign climate policy adoption. As mentioned in the previous section, however, the political and legislative debate preceding adoption of the CBAM already revealed that key stakeholders view it as a ‘multi-purpose instrument’ pursuing a number of other climate goals (Pirlot, 2022, p. 25). As early as the Inception Impact

³ ‘While the risk of resource shuffling from the use actual carbon intensities is recognised, this is not accounted for in the main modelling exercise. ... Quantification of the risk for resource shuffling is however very difficult, and requires detailed sectoral data’ (European Commission, 2021c, pp. 44–45).

Assessment in March 2020, for instance, the European Commission noted that the CBAM ‘should also indirectly promote the adoption of similarly ambitious policies by our trading partners’ (European Commission, 2020a, p. 3).

More recently, in a communication on the 2040 climate target released in February 2024, the European Commission acknowledged that the CBAM ‘incentivises governments to use pricing measures to reduce emissions’ (European Commission, 2024c, p. 5). Likewise, Gerassimos Thomas, head of the Directorate General overseeing the CBAM file, has noted the CBAM effect of ‘kickstarting conversations’ on carbon pricing ‘in countries and regions worldwide’ (Thomas, 2024, p. 52). Using blunter language, the Rapporteur for the CBAM in the European Parliament, Mohammed Chahim, stated that ‘the ultimate goal of the CBAM is to incentivise third countries to decarbonise, and establishing a carbon market would be an excellent step’ (Simon, 2024).

In conceding an ambition to stimulate the diffusion of carbon pricing, these statements align with a long tradition of EU outreach on carbon pricing through bilateral and multilateral channels (Biedenkopf, 2016; Biedenkopf & Torney, 2015; Wettestad et al., 2021), most recently culminating in the creation of a ‘Task Force for International Carbon Pricing and Markets Diplomacy’ (Abnett, 2024). Expanding the use of carbon pricing is by no means a purely European aspiration: other actors, including several international organizations, have joined the EU in endorsing carbon pricing as ‘the single most powerful and efficient tool’ to reduce emissions (IMF, 2019, p. 3; World Bank, 2014). In doing so, they enjoy the backing of the economic profession, expressed through petitions in support of carbon pricing signed by over 5,000 economists (CLC, 2019; EAERE, 2019).

Despite more than a decade of advocacy and support, with well over \$100 million disbursed for technical assistance and readiness activities through the World Bank alone (World Bank, 2021), carbon pricing had until recently seen only modest uptake, with few jurisdictions adopting new systems, and most policy initiatives suffering from limited emissions coverage and low average prices (IMF, 2019; Stiglitz & Stern, 2017). Political economy constraints, including concerns about social and economic impacts, have historically prevented a more vigorous expansion of carbon pricing (Carattini et al., 2018; Dolphin et al., 2020; Klenert et al., 2018). In public opinion surveys, carbon pricing has also consistently polled last among mainstream climate policy instruments (Barrez & Bachus, 2023; Fairbrother, 2022; Rhodes et al., 2017).

All the more surprising, therefore, that a number of trade partners of the EU have recently announced the introduction of a domestic carbon price or decided to accelerate drawn out processes to adopt one, often with implementation timelines that align with the onset of financial obligations under the CBAM. Indeed, several commentators have ascribed this dramatic surge to the CBAM (IETA, 2023; Pauw et al., 2022; Vitelli, 2023), and media reports citing domestic officials or stakeholders have mentioned the CBAM as a driver for new carbon pricing roadmaps in Brazil (Rostás & Brumatti, 2024), India (Acharya & Patel, 2023), Indonesia (Santoso, 2023), Morocco (Padín-Dujon, 2024), Russia (Pismennaya & Fedorinova, 2021), Thailand (Chantanusornsiri, 2023), Ukraine (Holovko et al., 2021), Vietnam (Nguyen, 2023), and the Balkans (Barbiroglio, 2023).

Some countries, such as Uruguay, have decided to convert existing excise taxes into a carbon price (Flores & Vásquez, 2023), while other jurisdictions, such as China, have decided

to expand their existing carbon pricing systems to match the sectoral coverage of the CBAM (MEE, 2024). In some cases, the relationship is even explicitly documented: Türkiye, for instance, cites the CBAM in its Medium Term Programme for 2024 to 2026, declaring that the ‘National Emission Trading System (ETS) ... will be developed in a structure compatible with the EU Carbon Border Adjustment Mechanism (CBAM)’ (Türkiye, 2023, p. 32). In Taiwan, the CBAM not only contributed to the adoption of carbon pricing legislation in 2023, but concern about emissions leakage also resulted in inclusion of a Taiwanese BCA (Taiwan, 2023, Art. 31).

While not all carbon pricing developments in recent years may be causally related to the CBAM, its environmental impact even as a mere contributing factor would be hard to overstate. Based on its current scope, the CBAM itself will only cover between 0.15% and 0.6% of global emissions through the imported goods it applies to (World Bank, 2024), whereas the potential coverage of emerging carbon pricing systems in Brazil, India, Indonesia, Türkiye and Vietnam as well as an extension of the existing carbon pricing system in China to industrial emissions could expand carbon pricing to a further 12.5% of global emissions, an order of magnitude higher than the CBAM alone.⁴

What has prompted this dramatic acceleration of carbon pricing? A single provision in the CBAM Regulation, Article 9, is likely responsible for the rapid diffusion of carbon pricing. Included in the CBAM Regulation to ‘avoid situations of double carbon pricing’ (European Commission, 2021c, p. 26), it allows accounting for carbon prices ‘effectively paid’ on embedded emissions in imported products (European Union, 2023, Art. 9(1)). As a result, the political economy of carbon pricing in countries with trade ties to the EU fundamentally changes. Stakeholders traditionally opposed to carbon pricing – from national treasuries to ministries of trade or economic affairs and emitting industries themselves – face a changed incentive structure due to the CBAM: rather than only posing a cost burden, a domestic carbon price now becomes a way of retaining revenue that would otherwise accrue to the EU, while also reducing compliance costs under the CBAM.

4.2 Leveraging the ‘Brussels Effect’ to Advance Carbon Pricing: Promise and Pitfalls

Conceptual frameworks such as the ‘Brussels Effect’ (Bradford, 2020) help explain how the CBAM incentivizes global carbon pricing by unilaterally leveraging market power to induce extraterritorial policy change. Rather than an effort to export EU norms, however, the ‘territorial extension’ of EU policies to gain regulatory traction over activities that take place outside its territory can also be seen as a means to galvanize third country or global action in pursuit of objectives that have been internationally agreed upon (Scott, 2014), often motivated by complicity in the underlying transboundary problem (Scott, 2019).⁵ Stimulating the uptake of carbon pricing is by no means the only area witnessing such regulatory extension, with the EU also deploying trade restrictions in the areas of chemicals regulation, biofuels and timber sustainability standards, and the proposed legislation on corporate sustainability due diligence.

⁴ Calculation by the authors, based on sectoral emissions data from World Data Lab (2024), assuming coverage of the sectors most commonly included in carbon pricing systems and also affected by the CBAM: electricity generation (except China), cement, chemicals, and metals production.

⁵ Such complicity, in this case, would be emissions incurred abroad by EU consumption patterns.

Scholars exploring the political game theory of BCAs more than a decade ago already anticipated their potential to stimulate wider adoption of carbon pricing. Because trading partners would want to prevent others from collecting the rents generated by carbon pricing and extract the surplus themselves, they concluded that ‘BCAs increase the pressure for the gradual dissemination of carbon prices around the world’ (Helm et al., 2012, p. 391). Interestingly, they also surmised that other countries would find it economically rational to introduce their own BCAs, and that is precisely what is currently occurring across a number of jurisdictions. In addition to Taiwan’s prospective introduction of a BCA, the United Kingdom has already decided to introduce its own CBAM from 2027 (United Kingdom, 2024), while Australia and Canada are considering similar measures (Australia, 2023; Canada, 2021), and the United States has seen the introduction of several legislative proposals in the U.S. Congress (Elkerbout et al., 2023; Keohane & Ye, 2024).

If this political dynamic acquires growing momentum, the ‘Brussels Effect’ of the CBAM could even unleash a ‘mega-Brussels Effect’ of cascading carbon prices and coordinated trade measures incentivizing greater global climate action (Orszag, 2023). Building on more than a decade of groundwork on carbon pricing through technical assistance and diplomatic outreach, the CBAM could thus become a catalyst for global carbon pricing (Delbeke & Vis, 2023), widely considered the first-best option for collective action on climate change (Ritz, 2022; Stern, 2007). Not only would that afford the CBAM unrivalled impact effectiveness as an environmental measure, it would also obviate the leakage concerns that prompted its adoption in the first place. In the meantime, the EU can continue to leverage its first mover advantage, mobilizing trade partners to adopt its preferred emissions accounting rules and approach to carbon pricing.

Such promise notwithstanding, the spillover effects of the CBAM enabled by accounting for foreign carbon prices also present challenges. Trading partners have already raised the possibility of exploiting this provision by collecting a carbon price on exports only (Law, 2023), which would significantly reduce the emissions coverage of the domestic carbon price. Other strategies to obtain credit under Article 9 of the CBAM Regulation without imposing a comparable carbon cost on foreign producers could include undisclosed refunds to affected producers, or reclassifying existing excise taxes as carbon pricing. What is more, the wording of Article 9 leaves room for interpretation about what constitutes a carbon price ‘effectively paid’, risking misunderstandings and frustration among trading partners as these elaborate their domestic carbon pricing systems.

Foreign stakeholders will raise questions as to whether offset project credits traded in the voluntary carbon market or units issued under Article 6 of the Paris Agreement constitute eligible forms of carbon pricing. Rules and procedures to operationalize this provision have yet to be elaborated by the European Commission in an implementing act, although it has already signalled its intention to apply a restrictive definition and only recognize an ‘explicit carbon price’, which “[i]n practice ... means through a cost under an emission trading scheme or by a carbon tax’ due to the ‘conceptual difficulties in determining the equivalence’ with any other climate policies (European Commission, 2021c, p. 26). Critics have contended that such an approach unfairly disadvantages countries whose domestic circumstances impede the adoption of a carbon price (Dominioni & Esty, 2023; Weil, 2021). Insistence on explicit carbon pricing could also be considered unduly coercive and at odds with differentiation principles

under international climate and trade law, violating the nationally determined architecture of the Paris Agreement (Boute, 2024).

As these examples demonstrate, any attempt to influence foreign policy developments through extraterritorial extension of EU norms will have to overcome technical, political and legal complexities. A careful balancing act between environmental stringency, conceptual simplicity, and flexibility is called for as the European Commission elaborates operational details on Article 9 of the CBAM Regulation. Accommodation of trading partners and their preferences has limits, however: any concessions, such as recognition of a carbon price imposed only on exports to the EU, would risk sacrificing much of the ‘Brussels Effect’ that has spurred global diffusion of carbon pricing.

Recognition of this spillover effect has important implications for the design of BCAs in other jurisdictions, and may have prompted the inclusion of a relevant provision on recognition of foreign ‘policies which impose explicit costs’ in the Clean Competition Act when it was reintroduced in the U.S. Senate in December 2023 (Clean Competition Act, 2023). Moreover, International cooperation and engagement of affected trading partners – as are already occurring under venues such as the Inclusive Forum on Carbon Mitigation Approaches and the G7 Climate Club – should be prioritized over any regulatory concessions to mitigate diplomatic tensions and forestall legal or technical challenges.

5. Conclusions

As stated in the introduction, this working paper set out to answer the question: how effective is the CBAM as a tool deployed by the EU to manage the environment-trade nexus, and what does its adoption tell us so far about the capacity of the EU to manage the complex interface of climate and trade policy? Overall, the process leading to entry into force of the CBAM has already yielded considerable policy output, and reflects an undeniable display of institutional effectiveness: successfully aligning diverse interests and stakeholders to overcome earlier reservations about BCAs and adopt the CBAM Regulation within a comparatively short timeline is no small achievement. At the same time, it remains questionable whether the CBAM can achieve its stated policy outcome and thereby claim impact effectiveness. To date, emissions leakage has not been empirically substantiated, and significant implementation challenges, such as administrative complexities, legal and political vulnerabilities, and circumvention opportunities could all undermine the ability of the CBAM to address leakage even if it were to materialize.

Despite these challenges, the CBAM may already be creating a powerful spillover effect – by incentivizing greater climate policy ambition across EU trading partners in form of accelerated diffusion of carbon pricing. Although not explicitly spelled out as an objective in the CBAM Regulation, this effect – which results from a provision allowing consideration of carbon prices paid in the country of origin – evidences the potential of market size as a strategic lever to promote extraterritorial policy changes. Ideally, the CBAM could thus set in motion a virtuous cycle, altering the political economy of climate action in trading partners in a way that allows emergence of a global carbon price through integration and convergence, for instance in the shape of a global carbon floor price (Parry et al., 2021). Still, as remarkable as this effect has proven so far, it also entails new challenges: as the EU proceeds to operationalize the CBAM, it will have to navigate several tradeoffs to avoid diluting the capacity of the CBAM

to stimulate carbon pricing. In the end, unilateral measures cannot fully substitute international cooperation at the environment-trade nexus.

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