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Nominal Adoption or Effective Deductibility? Institutional Readiness for Carbon-Price Recognition under the EU CBAM in Exposed Developing Economies

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Abstract

The European Union's Carbon Border Adjustment Mechanism (CBAM) allows the certificate obligation on imported goods to be reduced where a carbon price has been effectively paid in the country of origin, converting trade exposure into a fiscal choice between retaining carbon revenue domestically and transferring it to the importing jurisdiction. Existing research measures exposure and models aggregate impacts, but treats domestic carbon pricing as a binary attribute. Recognition under CBAM is not binary: it depends on sectoral coverage, on the price effectively paid net of free allocation and rebates, on installation-level monitoring and verification, on the absence of export relief, and on documentary capacity. This paper derives a six-criterion recognition-readiness rubric from Article 9 of Regulation (EU) 2023/956 and applies it through structured document analysis to the sixteen most CBAM-exposed developing and emerging economies, ranked by the World Bank economic exposure index. Readiness is essentially uncorrelated with exposure (Spearman's rho = -0.05). Six of the sixteen cases, including four of the eight most exposed, have no compliance carbon-pricing instrument at all. Among the ten that do, the effective-price criterion fails in seven: instruments exist but return most of their nominal cost through free allocation or rebates. Adoption is therefore common; effective payment is rare.

Keywords: carbon border adjustment; CBAM; carbon pricing; economic governance; state capability; developing economies

1 Introduction

The European Union's Carbon Border Adjustment Mechanism (CBAM) requires importers of covered goods — iron and steel, aluminium, cement, fertilisers, electricity and hydrogen — to surrender certificates corresponding to the emissions embedded in those goods [1]. The mechanism is customarily analysed as a trade measure, and its distributional consequences for developing exporters have been assessed in those terms [5], [11]. Yet CBAM contains a provision whose governance implications have attracted comparatively little analytical attention. Article 9 of Regulation (EU) 2023/956 permits the number of certificates to be surrendered to be reduced where a carbon price has been effectively paid in the country of origin [1].

That provision converts exposure into a fiscal choice rather than a fixed loss. An exposed exporting state may price the carbon content of its own production and retain the resulting revenue, or decline to do so and see an economically equivalent sum accrue to the importing jurisdiction. Framed this way, CBAM functions as an external inducement

to domestic carbon pricing, consistent with the logic of climate clubs [16] and with the design intent identified in the border carbon adjustment literature [13], [14]. Analysts have observed that states more exposed to the mechanism have been more likely to adopt or announce carbon-pricing instruments since it was first proposed [17].

The inference commonly drawn is that the incentive is working. That inference rests on an assumption this paper questions: that adopting a carbon price is equivalent to qualifying for a deduction. It is not. Recognition turns on the carbon price effectively paid in respect of the goods concerned, not on the headline rate of a domestic instrument, and the rules specifying how that effective price is established were finalised only as the definitive regime took effect [2]. An instrument may exclude the CBAM sectors; it may return most of its nominal cost through free allocation or rebates; it may lack installation-level monitoring capable of substantiating a claim; or it may be paired with export exemptions that eliminate the payment on which recognition depends. In each case the exporting state bears the domestic political and administrative costs of carbon pricing while the fiscal transfer proceeds unabated.

This paper takes that gap as its object. It asks: to what extent do the carbon-pricing instruments adopted by highly exposed developing economies meet the recognition conditions under CBAM? Two supporting questions follow. How does readiness align with measured exposure — is the response proportional to the fiscal risk? And which recognition criterion most frequently binds? Section 2 states the gap. Section 3 derives the rubric and the protocol. Section 4 reports the coding. Section 5 discusses implications. Section 6 concludes.

2 Literature Review

Three bodies of work bear on the question, and a fourth supplies the conceptual frame. The first measures exposure. The World Bank's CBAM exposure indices rank countries by the additional cost their exporters would face relative to an average EU producer, weighted by reliance on the EU market, and express excess carbon payments as shares of total exports, gross sectoral output and gross domestic product [5], [6], [7]. This literature establishes which economies have most at stake; it is, by construction, silent on how they have responded.

The second assesses impact. UNCTAD estimated aggregate income losses for developing countries [11], and firm-level evidence now indicates that the mechanism penalises high-emission producers rather than acting as a blanket trade barrier: during the reporting phase, high-emission Indian steel exporters reduced quantities and revenues to the EU while low-emission firms did not [12]. Reviews from a developing-country perspective emphasise the asymmetry between regulatory capacity in the EU and in affected partner states [4].

The third concerns design. The border carbon adjustment literature has examined leakage effectiveness, legal defensibility and trade-rule compatibility [13], [14], [15]. Within it, recognition of foreign carbon prices is understood as the provision carrying the measure's claim to even-handedness and its incentive function, and deductibility allows partner states to retain revenue that would otherwise be transferred [13], [14], [17].

What is established, then, is that exposure is measurable and measured; that impacts are material and concentrated; that recognition is central to the mechanism's design logic; and that exposed states have been adopting or announcing instruments. What remains uncertain is whether those instruments would qualify. The literature treats the presence of a domestic carbon price as a binary country attribute, whereas Article 9 makes recognition contingent on design and administrative conditions that vary independently of whether an instrument nominally exists [1], [2]. No study has converted those conditions into an analytical framework and applied it to the exposed-country set. That is the gap addressed here.

The conceptual frame is the state-capability literature. Andrews, Pritchett and Woolcock describe isomorphic mimicry, in which states adopt the visible forms of institutions carrying external legitimacy while the functions those forms should perform remain unrealised, producing capability traps that persist because form is rewarded and function is not observed [25]. Fukuyama's treatment of governance as administrative capacity rather than formal rules supports the same distinction [26]. Applied here, the expectation is that an externally imposed fiscal incentive transmitted through a trade instrument may elicit adoption of a carbon price as a legible institutional form, while the capacities on which recognition depends lag behind.

3 Methodology

3.1 Case selection

Cases are the sixteen most CBAM-exposed developing and emerging economies, ranked by the World Bank economic exposure index — total excess carbon payments as a share of GDP — computed for the aggregate of CBAM products [5], [6]. Economies classified by the World Bank as high income were excluded so that the sample speaks to developing-country capacity; this removes Trinidad and Tobago, which records the highest exposure in the dataset (1.91% of GDP), together with Russia and several Gulf economies. Selection on exposure is deliberate: the question is whether response is proportional to risk, which requires the highest-risk cases to be included by construction.

3.2 The recognition-readiness rubric

Six criteria are derived deductively from Article 9 of Regulation (EU) 2023/956 and the rules governing establishment of a carbon price paid in a third country [1], [2]. Each

corresponds to a condition on which a deduction claim can fail, and each is coded 0, 1 or 2, giving a maximum of twelve. Table 1 sets out the rubric.

Table 1. Recognition-readiness rubric derived from CBAM Article 9 and its implementing rules.

Criterion	Recognition condition	Coding (0 / 1 / 2)
C1 Legal status	A carbon-pricing instrument is in force, not merely announced or in draft.	0 = none/announced; 1 = enacted, not operative; 2 = in force
C2 Sectoral coverage	The instrument covers the installations and goods falling within CBAM scope.	0 = no CBAM sectors; 1 = partial; 2 = full coverage
C3 Effective price	The price is effectively paid, net of free allocation, rebates and exemptions.	0 = largely offset; 1 = materially offset; 2 = substantially paid
C4 MRV and verification	Installation-level monitoring, reporting and third-party verification exist.	0 = absent; 1 = partial/self-reported; 2 = independently verified
C5 Absence of export relief	Exports are not rebated or exempted in a manner that voids the payment.	0 = exports relieved, or moot; 1 = partial; 2 = no export relief
C6 Documentary capacity	Administrative capacity exists to certify and evidence the price paid.	0 = none; 1 = announced/untested; 2 = operational certification

Two conventions govern application. First, C3 measures whether the price is effectively paid, not its magnitude: eligibility for a deduction and the size of that deduction are distinct questions, and the rubric addresses the former. Second, C5 is scored only where the instrument covers CBAM goods; where it does not, no qualifying payment exists for export relief to void, and the criterion is scored zero rather than credited by default.

3.3 Sources and coding

Instrument status, type, start date, scope, coverage, headline price and allocation approach were taken for every case from the World Bank Carbon Pricing Dashboard compliance instrument detail as at 2026 [8], [9], cross-checked against ICAP status reporting [10], [19], [20], [21] and against national primary legislation where available [22], [23], [24]. Effective-price assessments draw on published evidence of allowance and rebate structures. Where operative detail could not be established from an official source the criterion was recorded as not assessable rather than inferred; no case in the final sample required this. Evidence supporting each score is recorded per case in the supplementary appendix.

3.4 Analysis

Criterion scores are aggregated per case; readiness is cross-tabulated against the exposure index and plotted, with quadrant boundaries at the respective medians; and the frequency with which each criterion takes the value zero is tabulated across cases possessing an instrument, to identify the modal binding constraint. Rank correlation between exposure and readiness is reported as a descriptive summary. With sixteen cases

no inferential statistics are computed and no causal claims are advanced; the analysis is a structured comparison and is reported as such.

4 Results

Table 2 reports criterion scores for all sixteen cases, ordered by exposure. Three patterns stand out.

Table 2. Recognition-readiness scores for the sixteen most CBAM-exposed developing and emerging economies, ordered by economic exposure.

Country	Exp. (% GDP)	C1	C2	C3	C4	C5	C6	Score /12
Mozambique	0.622	0	0	0	0	0	0	0
Ukraine	0.488	2	2	2	2	2	1	11
Egypt	0.221	0	0	0	0	0	0	0
India	0.098	2	2	0	2	2	1	9
Uzbekistan	0.070	0	0	0	0	0	0	0
Kazakhstan	0.038	2	2	0	2	2	1	9
South Africa	0.037	2	2	1	1	2	1	9
Georgia	0.034	0	0	0	0	0	0	0
Tunisia	0.028	0	0	0	0	0	0	0
Indonesia	0.020	2	0	0	1	0	0	3
Serbia	0.019	2	2	2	2	2	2	12
Nigeria	0.013	2	0	0	0	0	0	2
China	0.013	2	2	0	2	2	1	9
Türkiye	0.009	1	1	0	2	2	1	7
Zimbabwe	0.009	0	0	0	0	0	0	0
Brazil	0.007	1	1	0	1	2	0	5

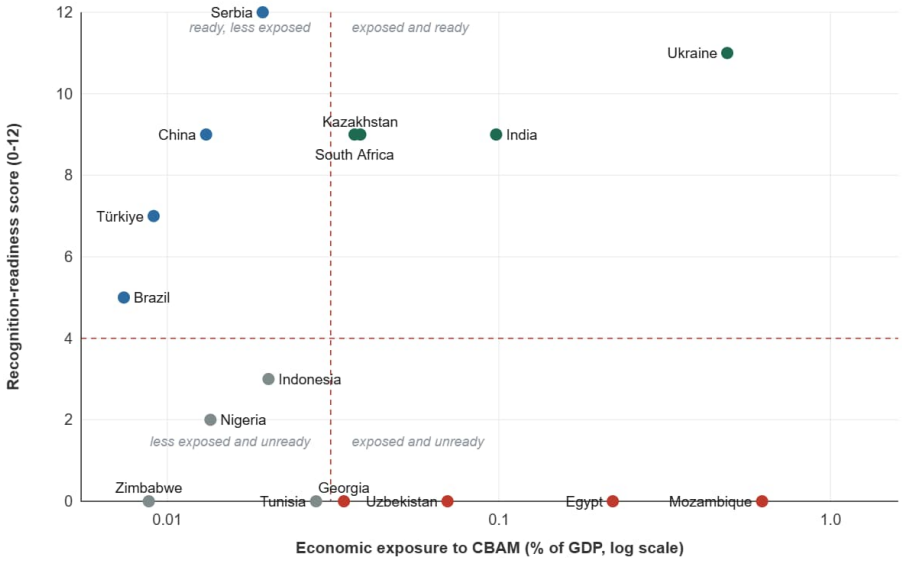
Note: exposure is the World Bank economic exposure index for aggregate CBAM products, as a share of GDP [5], [6]. Criteria as defined in Table 1. Source: Author.

First, six of the sixteen cases — Mozambique, Egypt, Uzbekistan, Georgia, Tunisia and Zimbabwe — have no compliance carbon-pricing instrument at all and therefore score zero throughout. Four of these are among the eight most exposed economies in the sample, and they include Mozambique, the most exposed case overall at 0.62% of GDP. For these states the deduction provision is presently inoperative: the whole of the CBAM charge on their exports accrues to the importing jurisdiction.

Second, readiness is essentially uncorrelated with exposure. Spearman's rank correlation between the two is −0.05 across the sixteen cases. Figure 1 shows the distribution: the cases divide evenly across the four quadrants, and the highest-readiness case, Serbia at 12 of 12, ranks eleventh of sixteen on exposure. Serbia adopted a greenhouse gas

emissions tax covering fertilisers, cement, iron and steel, aluminium and electricity, in force from January 2026 and enacted expressly so that the price paid can be deducted against CBAM [22]. Türkiye, similarly, has a mature monitoring, reporting and verification system covering roughly 770 installations and an enacted climate law, but no operative price [21], [23].

Figure 1. Exposure and recognition readiness across sixteen CBAM-exposed developing and emerging economies. Quadrant boundaries at the respective medians. Source: Author.



Third, among the ten cases that do possess an instrument, the binding constraint is overwhelmingly the effective-price criterion. C3 takes the value zero in seven of those ten. Legal status never binds — every adopter scores full marks on C1 — and monitoring capacity rarely binds, failing in one case only. The pattern holds across dissimilar systems. China's ETS was expanded in 2025 to steel, cement and aluminium, but 2024 allocation equalled verified emissions and the 2025 intensity adjustment is capped at 3% of verified emissions, so net cost is minimal [19]. Kazakhstan allocates entirely free through output-based benchmarking. India's Carbon Credit Trading Scheme entered compliance in FY2025–26 with third-party verified reporting, yet its main price rate remains nil [20]. South Africa levies the sample's highest headline rate, roughly USD 18, but a 60% basic tax-free allowance retained to 2030 reduced effective payments to a fraction of it. In each case a substantial institutional apparatus exists and functions; what is absent is a price actually paid.

5 Discussion

The findings support three observations, and constrain a fourth.

The response is not proportional to the risk. A rank correlation of −0.05 between exposure and readiness indicates that the states with most fiscally at stake are not systematically those best positioned to retain the revenue. The four zero-scoring cases in the high-exposure half of the sample are the clearest instance: Mozambique, Egypt, Uzbekistan and Georgia face the largest proportional charges in the sample and have no instrument through which to claim any deduction. This is consistent with the capability account [25], [26], and it qualifies the inference that observed adoption demonstrates the incentive channel is operating. Adoption appears instead to track factors other than exposure, such as proximity to EU accession processes, as the Serbian and Turkish cases suggest — though the design here cannot test that.

The binding constraint is fiscal design, not administrative capacity. This was not the expected result. The capability literature would predict failure concentrated on monitoring and verification, yet C4 fails in only one of ten adopters while C3 fails in seven. Several of these systems have installation-level monitoring with accredited third-party verification — the expensive, slow-to-build component — yet deliver little effective payment, because allowances are allocated free, benchmarks are set at observed emissions, or statutory allowances offset the headline rate. The constraint lies in distributive politics rather than state capacity: free allocation and tax-free allowances are the concessions that make carbon pricing domestically survivable, and they are precisely what removes its value for recognition. That diagnosis implies a different remedy from technical assistance.

Eligibility and relief are distinct. The rubric measures whether a price would be recognised, not how much relief it delivers. Ukraine scores 11 of 12 on a tax of roughly USD 1 per tonne; its instrument is genuinely paid and well documented, but the deduction it supports is small against an EU price of a different order. High readiness is therefore a necessary condition for retaining carbon revenue, not a sufficient one, and the two dimensions should be read together rather than collapsed.

Four limitations qualify these results. Sixteen cases support structured comparison, not inference; the rank correlation is descriptive. Coding against legal criteria involves judgement, mitigated but not eliminated by a published codebook. The legal baseline is moving [2], [3], so scores are conditional on the position as at the date stated. And readiness is an analytical construct: it does not predict how the Commission would determine any claim, and C6 rests on thinner evidence than C1 to C4, since few states have built certification machinery of any kind.

6 Conclusion

The literature on CBAM and developing economies has established who is exposed and what the aggregate costs may be, and has observed that exposed states are adopting carbon prices. It has not asked whether those instruments would qualify for the deduction

that makes adoption fiscally rational. Applying a rubric derived from the recognition provision itself to the sixteen most exposed developing and emerging economies, this paper finds that adoption and recognition diverge sharply. Six cases have no instrument; readiness is uncorrelated with exposure; and among adopters the effective-price criterion fails in seven of ten.

The policy implication follows from where the constraint sits. Because failure concentrates on effective price rather than on monitoring capacity, technical assistance directed at measurement infrastructure — the standard instrument of climate-trade cooperation — addresses a problem that is, in most of these cases, already solved. What determines whether an exposed state retains its carbon revenue is the allocation and allowance design that domestic political settlements have produced. Re-scoring once the implementing rules are settled would allow the framework to serve as a monitoring instrument rather than a single assessment.

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Conflict of Interest

The authors declare no conflict of interest.

Conflict of Interest

NAA: conceptualization of idea, writing the original draft. DSD: Data visualization and analysis.

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