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Window-Dressing or Golden Path?

Carbon Pricing Schemes of the European Union

A Qualitative Policy Analysis of the European

Carbon Border Adjustment Mechanism

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Abstract

This thesis analyses the Carbon Border Adjustment Mechanism (CBAM) of the European Union (EU) that was introduced to address the issue of carbon leakage. To explain how and to what extent CBAM could potentially trigger externalisation, a qualitative policy analysis combined with a theory-application approach of the so-called Brussels Effect was used. CBAM can be located between window-dressing and the golden path. Its shows to have the relevant *Market Size* for some states, a solid basis of *Regulatory Capacity* (with room for improvement), the necessary stringency of *Standards* (that is however linked to the phase out of free allowances), CBAM goods being highly *Inelastic Targets* of the EU's regulatory regime and a strong *Non-Divisibility* in the technical and economic domain. Even though CBAM shows great potential in minimising carbon leakage and improving the effectiveness of the EU Emissions Trading System, a universal Brussels Effect triggering global effects of externalisation and unilateral regulatory authority of the EU, is unlikely since large emitters like the US and China are not significantly affected by it.

Diese Masterarbeit analysiert den CO2-Grenzausgleichsmechanismus (CBAM) der Europäischen Union (EU) welcher eingeführt wurde, um Carbon Leakage zu entgegnen. Um zu erklären, wie und in welchem Ausmaß CBAM potentiell Externalisierung hervorbringen könnte, wendet diese Arbeit die Brussels Effect Theorie im Rahmen einer qualitativen Policy-Analyse an. Die Ergebnisse zeigen, dass CBAM die relevante Marktgröße hat (für einige Staaten), eine solide Basis an regulatorischen Kapazitäten (mit Raum für Verbesserungen) sowie die notwendige Strenge im Policy-Design (die an das Auslaufen kostenloser Emissionszertifikate geknüpft ist). Zudem sind CBAM-Güter in höchstem Maße inelastisch und an EU-Regularien gebunden. Auch zeigt sich, dass eine Standardisierung und Harmonisierung von Produktionsprozessen als wahrscheinlich gelten. Obwohl CBAM großes Potential darin zeigt Carbon Leakage zu minimieren und die Effektivität des EU Emissionshandelssystems zu verbessern, gilt ein umfassender Brussels Effect, der globale Externalisierungseffekte hervorbringt als unwahrscheinlich, da relevante Staaten wie die Vereinigten Staaten oder China nicht signifikant davon betroffen sind.

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1. Introduction

Heat waves, droughts and floods, rising seas, ocean changes, arctic ice thaws and species loss are just some of the challenges that lie ahead (Maizland 2023). Addressing, mitigating and adapting to the(se) effects of climate change is subject to global and national climate policy efforts and actions (ibid.). Carbon dioxide emissions and other greenhouse gas emissions, being identified as severe drivers of global warming and consequently climate change, are regularly targeted by policies (NASA 2024). One policy approach to reducing greenhouse gas emissions is the use of carbon pricing schemes to enforce or incentivise carbon reduction and the so-called green transition. 'The green transition means a shift towards economically sustainable growth and an economy that is not based on fossil fuels [...]. A sustainable economy relies on low-carbon solutions [...]' (Ministry of the Environment Finland 2024). Carbon pricing is a tool to internalise the actual costs of greenhouse gas emissions and tie them to their source (World Bank Group 2024). Externalised costs are expenses that are paid by the general public related to damages of crops and real estates (due to floodings or rising sea levels) or human health (due to heatwaves and droughts) that are caused by greenhouse gas emissions (ibid.). Internalising those costs according to a polluter-pays-principle, is supposed to set a market-based incentive for reducing emissions (ibid.).

In their 'State and Trends of Carbon Pricing 2023' report, the World Bank Group provides an overview of existing and emerging policy instruments worldwide (see World Bank Group 2023). As of today, Carbon taxes and emissions trading systems cover 23 percent of global emissions in 2023 while it was only 7 percent a decade ago (World Bank Group 2023, p. 7), indicating a trend in this direction. At the same time, within the past ten years, government revenues from these carbon pricing schemes have grown nearly fivefold, reflecting more ambitious climate and emission goals worldwide (ibid.). Revenues from Emissions Trading Systems (ETSs) and carbon taxes reached a record high of nearly USD 100 billion (World Bank Group 2023, p. 8). Although there were challenging global economic circumstances and geopolitical instability in 2023, carbon pricing policies were high up on the political agenda (ibid.).

‘Several high-emitting countries strengthened domestic climate policies and targets, though global efforts still fall short of what is required’ (ibid.). Despite the global energy crisis due to Russia’s war of aggression against Ukraine, ETSs and carbon taxes were very rarely withdrawn or repealed (ibid.). While most carbon pricing policies and instruments exist in high-income regions such as North America and Europe, emerging economies are increasingly exploring suitable policy options and mechanisms for their needs and goals (World Bank Group 2023, p. 9). The general outlook on carbon pricing is that carbon credit markets are expected to grow significantly while at the same time becoming more diverse and sophisticated (ibid.).

This outlook, together with the pertinence and urgency of the issue, is taken as a reason to further scientifically explore and analyse carbon pricing schemes. The relevance of the topic is rooted in the ambitions and advantages of developing and applying the most efficient and sustainable climate policies. The research interest of this thesis is concerned with the European Union’s (EU) climate policies and their effects on third-state manufacturers. More specifically the aim is to analyse potential effects of externalisation of the Carbon Border Adjustment Mechanism (CBAM) that was adopted in May 2023 (European Parliament and Council 2023).

As a central element of the EU Green Deal and the Fit for 55 - package, the CBAM is supposed to be a major contributor to achieve the climate goals of the EU (ibid.). The purpose of the CBAM is to minimise and prevent carbon leakage, as this term describes the phenomenon of outsourcing emission-intensive production processes to non-EU states (ibid.). Additionally, the CBAM works as competitiveness protection through changing relative prices between domestic goods and imports (Zhong & Pei 2023, p. 8). The goal is to restore competitiveness of the EU which was imbalanced due to unilateral carbon policies (ibid.), as the price for imported goods are equalised to domestic prices (that are under carbon regulations) (ibid.). After a transitional phase starting in October 2023, the embedded emission of iron, steel, aluminium, cement, electricity, fertiliser and hydrogen will be priced when imported into the EU (European Parliament and Council 2023). Embedded carbon refers to emissions related to the production or transportation of goods starting from the extraction of raw materials, manufacturing and ends with final delivery to consumers (ibid.). From then on importers are obliged to calculate these embedded emissions of the goods they

externally source, buy the respective amount of CBAM certificates (similar to ETS allowances) and eventually surrender the respective number of certificates in relation to the embedded CO2-equivalent of the imported products annually. If there is already a carbon pricing scheme applied in the third state to the respective goods, importers do not have to buy additional CBAM certificates when importing (ibid.).

Thus, CBAM seeks to externalise EU climate policies, without making de jure specifications for third countries themselves. Drawn from this, the research interest of this paper focuses on the external impact of CBAM which will be analysed through Anu Bradford's theory of the Brussels Effect. Since CBAM is a comparatively new policy, the character of the analysis is that of a foresight study aiming at making predictions and not present-time assertions or explanations.

The scientific interest is based on the following research question: How and to what extent could the Carbon Border Adjustment Mechanism trigger externalisation? The line of argumentation is based on five hypotheses that are all rooted in the Brussels Effect theory and its analytical framework of different necessary conditions. Since this thesis is concerned with the consequences or effects of CBAM that are future outcomes, the claims and research outcomes follow the logic of predictions. The central argument is that 'the more significant the five necessary conditions of the Brussels Effect are fulfilled, the more likely externalisation of CBAM is to occur'. The individual hypotheses are developed and explained in more detail in chapter four.

The Carbon Border Adjustment Mechanism of the European Union and its related climate policies can be located between window-dressing and the golden path. Its shows to have the relevant *Market Size* for some states, a solid basis of *Regulatory Capacity* (with room for improvement), the necessary stringency of *Standards* (that is however linked to the phase out of free allowances), CBAM goods being highly *Inelastic Targets* of the EU's regulatory regime and a strong *Non-Divisibility* in the legal, technical and economic domain. Even though CBAM shows great potential in minimising carbon leakage and improving the effectiveness of the EU ETS, a universal Brussels Effect triggering global effects of externalisation and unilateral regulatory authority of the EU, is unlikely since large emitters like the US and China are not significantly affected by it.

To answer the research question, this thesis is structured based on the following working steps: The literature review will provide an overview of previous related research and gives a summary of the state of the art. This is followed by a background section that first explores the external dimension of European climate politics. This will be further narrowed down in a chapter on carbon markets and the European Emissions Trading System. The last chapter of the background section deals with carbon pricing as a tool in climate politics. While the subsequent chapter four explains the central theory of this paper, the Brussels Effect, in detail, chapter five presents the methodology and research design applied for analysis in this paper. The central empirical element and analytical focal point, chapter six, examines the EU's Carbon Border Adjustment Mechanism and its effects of externalisation according to the Brussels Effect using one subchapter each for, *Market Size, Regulatory Capacity, Stringent Standards, Inelastic Targets* and *Non-Divisibility*. A discussion of the findings as well as the actual predictions, can be found before the last chapter summarises and concludes on the analytical outcomes, methodology and future research.

2. Literature Review

The following Literature Review provides an overview of previous research in the field of policy diffusion, as well as closely related theories of the Brussels Effect. The aim is to clarify existing connections and similarities of the Brussels Effect to previous and other theories to compare and discuss these eventually. Anu Bradfords theory joins the line of a long tradition of research, developing explanations for and finding origins of the EU's regulatory influence.

One of the first notions to describe the European Union and its global (regulatory) influence was developed in 1972 by François Duchêne which he called 'civilian power Europe' (see Duchêne 1972). Duchêne argues that the Union's power mainly consists of using civilian means for persuasion in international politics and pursuing civilian ends (ibid.). This concept is a counter proposal to the back then prevailing perception of Europe as a military power (ibid.).

A similar concept from 2002 by Ian Manners explains policy externalisation not through hard power but normative leadership of the European Union (see Manners 2002). 'Normative power Europe', describes the intrinsic maxime guiding EU actions and that those decisions actually bring about changes of norms in the international system (Manners 2002, p. 252). Manners attributes the EU with the power 'to define what passes for "normal" in world politics' (Manners 2002, p. 253) while not only being a military power, which was the previous notion (ibid.).
In 2010, Kelemen explored the EU's role as global leader in environmental governance (see Kelemen 2010). Kelemen argues that the EU significantly gained its influence and status in this policy area through its identity as a normative and civilian power in the international arena (Kelemen 2010, p. 346).

In 2005, Sophie Meunier and Kalypso Nicolaidis completely moved away from the notions of hard or normative power and first came up with their theory of a 'trade power Europe' (see Meunier and Nicolaidis 2005). 'Not only does the EU derive some inherent power from trade, as one of the major actors shaping the global trade agenda, but it has also long used trade as the backbone of its normative power, using its market

access in order to obtain political concessions from its commercial partners (Meunier and Nicolaidis 2023, p. 155).
Saikawa (2013) supports this theory, as she finds trade, especially export dynamics, to be mainly responsible for voluntary environmental regulation and diffusion effects. In her study, she finds that direct export pressure from one country's export markets and indirect export pressure from competitors, causes firms to adopt higher standards in order to secure access to their export destinations (Saikawa 2013, p. 27).

Chad Damro introduced the term ‘market power Europe’ to describe that the EU ‘exercises its power through the externalization of economic and social market-related policies and regulatory measures’ (Damro 2012, p. 682). Damro argues that normative characteristics are often not sufficient/suitable to explain effects of externalisation and the influence the EU has on the behaviour of other jurisdictions.

In 2017, Wolfgang Wagner introduced another term to describe external effects and global influence the EU and its policies have: ‘liberal power Europe’ (see Wagner 2017). According to Wagner, ‘liberal power Europe’ overcomes the weak points of normative or civilian power Europe, as it recognises that norms may also work constraining in foreign policy making, while there is a ‘contested nature of norms and conflicts between norms’ (Wagner 2017 p. 1398). Additionally, it ‘encourages an engagement with the vast literature on the distinctive policies of liberal democracies’ (ibid.).

A slightly different yet closely related concept to the Brussels Effect is that of regulatory competition. ‘Regulatory competition describes the activity of private or public lawmakers who intend to produce novel or alter current legislation in response to competitive pressure from other private or public lawmakers’ (Gödker and Hornuf 2019). Even though it being an idea from the late 19th century, regulatory competition experienced a new intensification due to globalisation (Rameix 2017). Competitive governance can either generate a race-to-the-top effect as actors can opt for their most favourable jurisdiction (Haufler and Maier 2019, p. 180) or a race-to-the-bottom effect as jurisdictions constantly have to fear driving investment abroad (Vogel 2001, p. 163).

Trading up essentially describes the same concept as regulatory competition and was introduced by Vogel in 1997 (see Vogel 1997). He argues that the 'California effect' prompts a trading up of regulatory standards such as product or environmental policies that are adjusted in resemblance to the most strict or ambitious standards (Vogel 1997, p. 563). The Brussels Effect closely builds on this theory but brings Vogel's assumptions into a global context (that exceeds US borders) and provides the exact conditions for unilateral regulatory influence to occur.

In 2021, Blatter et al. introduced an approach to streamline policy diffusion studies and developed a theoretical framework based on four mechanisms to research and explain diffusion effects (see Blatter et al. 2021). According to them, diffusion can be interest-driven, rights-driven, ideology-driven or recognition-driven while these can appear simultaneously. The researchers also provide 'paradigmatic pathways' for each mechanism, describing the underlying actions or processes like 'exchange of information', 'conditionality' or 'policy expertise' (Blatter et al. 2021, p. 16).

Another explanation for policy diffusion effects comes from Gilardi who identified learning, competition and emulation as commonly used categories for explanation (Gilardi 2016, p. 9). In the case of learning, policy adoption in one polity is more likely if it has been successful in another polity before (ibid., p. 10). Competition can act as an accelerator of policy diffusion when it comes to securing limited resources of any kind (ibid.). Compared to learning, emulation carries the symbolic level policies can have thus, policy diffusion is more likely if policies enjoy acceptance (ibid.). However, despite their general recognition these factors are challenging to be consistently operationalised which not only could negatively affect the quality of individual research designs but also the comparability of findings (Gilardi 2016, p. 8).

Gilardi and Wasserfallen published another paper (2019) that suggests that there is an additional dimension to policy diffusion that has been neglected so far. Politics play a central role as 'ideology and electoral consequences matter as much as policy consequences' (Gilardi/ Wasserfallen 2019: p. 1253). Moreover, diffusion can already influence the political discourse ahead of any concrete policy formulation and global developments and perceptions can lead to 'self-fulfilling prophecies' (ibid.). Lastly, decoupling diffused policies from their origin can be instrumentalized by different

political constituencies (ibid.). The paper concludes that there is a gap in the literature on policy diffusion when it comes to research in the issue-definition stage and events outside the policy adoption stage (ibid.).

Another aspect to consider is a geographic dimension when it comes to policy diffusion (Mitchell 2018: p. 424). Through exploratory spatial data analysis, the author found that diffusion was more likely to happen in neighbouring state polities in the case of the United States of America (ibid.: p. 443). Yet, geographical proximity is neither a necessary nor sufficient condition for policy diffusion but should be considered to be an additional factor of explanation and requires further research (ibid.).

Butler et al. (2017) again, analysed the United States of America and discovered that political ideology affects policy diffusion, using an alternative and experimental research approach. For policy-makers who are ideologically reluctant against a certain policy, an emphasis on the policy's success can help to leverage diffusion effects (ibid.). 'Strong empirical results suggest that governments are most likely to adopt the laws and practices of ideologically similar governments' (ibid.: p.37). These findings suggest that learning-based diffusion can only occur once ideological biases are overcome (ibid.: p.47).

It becomes apparent that the Brussels Effect Theory combines several different elements of previous research and concepts such as market power Europe (*Market Size*), liberal power Europe as well as regulatory competition (*Stringent Standards*), trade power Europe (*Inelastic Targets*), regulatory competition (*Non-Divisibility*). These are just some examples that illustrate the close connections and scientific ancestors Anu Bradford drew her theory from. Yet, the Brussels Effect is an addition to previous concepts, as it not only combines many single concepts to a coherent theory but is also a contemporary theory in light of rapidly changing global dynamics. In the course of this paper, an individual chapter elaborates in detail on the Brussels Effect, making the environment the theory is embedded in even more clear.

This thesis is a contribution to the applied field of policy diffusion and externalisation research by using the existing theory of the Brussels Effect by Anu Bradford (2020) to explain and foresight certain effects of externalisation in relation to the EU's Carbon

Border Adjustment Mechanism. The following analysis will contribute to the areas of European studies and international relations as well as to the general understanding of trade dynamics and policy diffusion effects, with a focus on the interconnectedness of these fields.

3. Background

a. External Dimensions of European Climate Politics

Considering the strong external dimension of the Carbon Border Adjustment Mechanism, as it addresses the challenge to globally - not only within the borders of the European Union - reduce greenhouse gas emissions. The goal of this chapter is to give an overview of the external dimensions of European climate politics and present its fundamental dynamics. The European Union has a long tradition at balancing and working at the nexus of foreign and climate policy with the latter carrying external dimensions in a multitude of varieties and being firmly established throughout the whole policy field (Climate Policy Info Hub 2024). Since the Carbon Border Adjustment Mechanism is located at this exact nexus, the following chapter will present and analyse two layers of external European climate policy: One covers the polity dimension of climate diplomacy including multi- and bilateral relations as well as the participation in international conferences and membership in respective international organisations and entities. The other one being EU policies, strategies and programs, representing the policy dimension to this topic.

‘The EU is a party to more than 30 multilateral environmental agreements (MEAs) and uses both bilateral agreements and its neighbourhood policy to bolster environmental standards at internal, regional, and national levels. As a so-called ‘Regional Economic Integration Organization’, the EU has acquired the legal status to act at international level either as full party to MEAs and related Conferences or Meetings of the Parties (COPs or MOPs) or - in the UN context - as an observer’ (Lenschow 2021, p. 316). Article 191 of the Treaty of the Functioning of the European Union enshrines the EU’s role in ‘promoting measures at international level to deal with regional or worldwide environmental problems, and in particular combating climate change’ (European Union 2008). Climate diplomacy is the main tool connecting climate and foreign policy, yet there exists no common definition of the term (Climate Diplomacy 2024). The European Commission builds its climate diplomacy on four columns: multilateralism, addressing implications of climate change on peace and security’, raising global ambitions and ‘enhancing international climate cooperation through advocacy and outreach’ (Climate Diplomacy 2024). To facilitate these ambitions the European

External Action Service (EEAS) uses several foreign policy instruments such as 'policy dialogues, high ambition alliances and partnerships, international negotiations' as well as financial means to support international and sustainable development (EEAS 2021). The Council of the European Union also identifies several aspects of climate diplomacy to its foreign policy: 'implement the Paris Agreement', 'limit global temperature increase to 1.5 degree Celsius [...]', 'support the most vulnerable countries in adapting to climate change effects, and', 'increase collective climate finance' (Council of the European Union, 2024). Most recent data from 2022 show how the EU spent EUR 28.5 billion in climate finance to support and enable third states to adapt to and mitigate climate change effects, which makes it the largest provider of public climate finance (ibid.).

There is a lack of coherence and clear characterisation when looking at the EU's biggest and most ambitious policy project, the Green Deal (see Koch and Keijzer 2021). Introduced in December 2019 by the European Commission, the European Green Deal is a set of legislative proposals, legislation and measures to achieve the goal of at least 55% less net greenhouse gas emissions by 2030 and net-zero emissions until 2050 in the European Union (European Commission 2021). To achieve these two overarching goals, the Commission defined six policy objectives: "Making transport sustainable for all", "Cleaning our energy system", "Leading the third industrial revolution", "Renovating buildings for greener lifestyles", "Working with nature to protect our planet and health", "Boosting global climate actions" (ibid.). Frans Timmermans, former Commissioner responsible for implementing the European Green Deal, stated that delivering on the objectives will require 'a tectonic shift in the way our society is structured' (Financial Times 2020), highlighting the huge challenges ahead and efforts necessary to live up to the self-imposed goals. Additionally, the measures taken so far reach these objectives and the targets stated in the Green Deal, show an implementation gap (Fleming and Mauger 2021, p. 169). Together, they only account for a total emission reduction of up to 47% compared to 1990 levels and not for the legally binding goal of 55% (ibid.).

The 'EU has referred to this "external dimension" of the Green Deal without further defining it and appears to primarily understand it as a reflection of the internal strategies and as a call for the EU's partner countries to follow a sustainable recovery

trajectory similar to its own' (Koch and Keijzer 2021). What also makes it difficult to outline the external dimension of the Green Deal is that it is an intrinsic and deeply intertwined part of it as a whole and not something standing out or being particularly highlighted in a separate chapter or an annex for instance (ibid.). Even though the EU regularly positions itself as a global climate advocacy leader and role model it has a significant 'global ecological footprint' (Koch and Keijzer 2021) caused by its imports of raw materials (ibid.). Additionally, 'it also contributes significantly to global environmental pollution, deforestation and loss of biodiversity' (Koch and Keijzer 2021). Ecologically favourable outcomes are not only complicated by internal challenges but are further impeded by external obligations to support third states in their climate actions (ibid.).

In the light of severe current geopolitical challenges, the EU's approach to the international dimension of climate policy and climate diplomacy have yet to show their endurance and efficacy (Dennison and Engström, 2023). While concepts of climate capitalism (Newell and Paterson 2010) and carbon colonialism (see Parsons 2023; Erdogan 2024) build the beginning of newly emerging concepts of criticism of the status quo. The upcoming chapter further narrows down the topic and elaborates on carbon pricing as a tool in climate politics.

b. Carbon Pricing as a Tool in Climate Politics

There are several ways of implementing carbon pricing in practice. Direct approaches include emission trading systems, taxation of CO2-emissions or of the CO2-content of fossil fuels (ibid.). Further, there are pricing systems based on compensation where carbon credits from climate protection projects are bought, covering past emissions (ibid.). So-called 'results-based climate finance' works in the opposite direction and provides payments as soon as previously determined goals of the polluter are achieved (World Bank Group 2024). Internal carbon pricing by governments, financial institutions or companies is used to guide policy-making (United Nations Framework Convention on Climate Change (UNFCCC) 2024). Despite these direct ways of carbon

pricing, there are other approaches to increase the price for greenhouse gas emissions like cutting subsidies for fossil fuels or energy production (ibid.).

The Kyoto Protocol introduced carbon pricing on an international level in 1997 (ibid.). It allowed so-called Annex I states (mainly countries of the Global North) to realise their emission reduction targets through emission trading, or the Joint Implementation (cooperation between two countries) (ibid.). Further it established the Clean Development Mechanism where subsidised climate projects in third states could be used to improve one's own emission targets (ibid.).

There are several aspects of criticism of carbon pricing as a tool for climate action. For instance, most carbon offset projects such as reforestation initiatives are located in the Global-South, while most of these projects are bought and financed in the Global-North (Wang 2021). In many cases these projects lack adequate regulation leading to discrimination, displacement or violence against indigenous people and communities (Boyle 2021). Carbon offset practices have been described as a new form of colonialism or ‘neocolonialism’ (see Wang 2021; Boyle 2021; Bahambra; Newell 2022). Further, carbon prices are often too low to bring about the intended effects of emission reduction as the economic incentives are too weak (Wolf 2021). Border carbon adjustments can improve global cost-effectiveness only to a certain extent (Böhringer et al. 2022, p. 27) and while having a strong burden-shifting effect, they also pose equity issues for developing countries (ibid.).

Research finds several advantages to carbon pricing. Even though a higher carbon tax does not automatically correlate with a greater reduction in CO2 emissions (Abrell and Kosch and Rausch 2022, p.17), a carbon tax is an effective instrument to reduce CO2 emissions (Abrell and Kosch and Rausch, 2022, p. 2). There are learning spillover effects ‘between climate change policies, whereby governments that implement some climate policies are subsequently better positioned to implement other climate policies’ (Dominioni 2022, p. 901). However, these effects are not restricted to one jurisdiction, the implementation of a ‘border carbon adjustment mechanism’ could also leverage effective carbon pricing in other jurisdictions (Dominioni 2022, p. 902).

Despite these advantages, whether or not carbon pricing policies (CPPs) are adopted on a national level and become a tool of climate policies is influenced by several variables (see Steinebach and Fernández-i-Marin and Aschenbrenner 2021). A high level of economic development makes it more likely to switch to carbon reduction policies, since the financial capacities are bigger and more resilient (ibid., p. 279). States with a large population or particularly strong economy, experience more pressure from the international community to adopt CPPs due to their influence (ibid., p. 280). Aspects in relation to the economic situation of a state that make the adoption of CPPs less likely include having high emissions per capita within one's economy due to strong national interest groups (ibid.). In general, ‘democracies exhibit stronger commitments to mitigate climate change’ (ibid.). Trade-related interdependencies and ‘reciprocal influencing’ (ibid.) represent additional variables affecting decision-making on carbon pricing policies (ibid.) as well as membership in international institutions or participation in the international climate regime (ibid, p. 281). These aspects help understand possible policy options and development cooperation pathways to sustainably initiate CCPs.

The Organisation for Economic Cooperation and Development (OECD) recommends three benchmarks for effective carbon prices to reach the goal of net-zero emission by 2050 (OECD 2021). ‘First, EUR 30 per tonne of CO2 as an historic low-end benchmark of carbon costs. Second, EUR 60 per tonne of CO2 as mid-range estimate for carbon costs in 2020, and at the same time low-end estimate for carbon costs in 2030. Third, EUR 120 per tonne of CO2 as a central estimate for carbon costs in 2030’ (ibid.). Since the EU carbon market works through an auctioning system and other influencing factors, prices vary from 100 euro in February 2023 to 57 euro in February 2024 (Ember 2024). Thus, being slightly below the advised price benchmark.

This chapter provided a short overview of carbon pricing concepts, the advantages and challenges they bear as well as conditions for carbon pricing policies to be adopted. Despite the disadvantages, carbon pricing remains a useful tool from an ecological perspective by reducing greenhouse gas emissions as well as from an economic point of view. However, it is crucial for existing and future carbon pricing schemes to consider fairness concerns in their design to ensure inclusiveness and

legitimacy. The upcoming chapter briefly explains the system of carbon markets these carbon prices are located and economised in.

c. Carbon Markets and the European Emissions Trading System

The following chapter outlines the development of the European Emissions Trading System (ETS) as well as its characteristics such as the cap-and-trade mechanism and the allocation of free allowances. Further it elaborates on weaknesses of and criticism about the ETS, to introduce policy gaps in this field. The ETS was launched in 2005 under the supervision of Commission President José Manuel Barroso and is based on the framework directive 2003/87/EC (European Parliament and Council of the European Union 2003). To align with the EU's climate ambitions and geopolitical climate targets, it is regularly updated and revised (ibid.). Before entering its fourth trading phase spanning from 2021 to 2030, the EU ETS was revised in 2018 against the backdrop of the 2030 climate and energy framework as well as in 2021 relating to the European Green Deal and the 'Fit for 55'- initiative (European Commission 2024).

The EU Emissions Trading System works on a 'cap and trade' principle (ibid.). 'A cap is a limit set on the total amount of greenhouse gases that can be emitted by the installations and aircraft operators covered by the system' (ibid.). This pool is reduced each year to incentivise a long-term decrease in emissions (European Parliament and Council 2003). Emissions allowances are what is in this pool, with one allowance providing the right to emit one tonne of carbon dioxide equivalent (ibid.). Companies must surrender the respective number of allowances in relation to their emissions annually (ibid.). Companies that participate in the EU ETS mainly buy allowances on the EU carbon market but are also allocated free allowances (ibid.). Sectors that are regarded to be at risk for carbon leakage receive a larger share of allowances for free (Tamellini 2023). 'Once a sector is on the list, individual installations receive up to 100 percent of their estimated emissions for free based on the emissions intensity of their production compared to other installations in their sector' (ibid.). The distribution of these free allowances was poorly targeted and as a result 'the speed of

decarbonisation in the power sector was significantly reduced' according to a report by the European Court of Auditors (European Court of Auditors 2020).
There is a tendency to rising prices in recent years and simultaneously rising revenues from these auctions (European Environment Agency 2023). Revenues grew from EUR 5 billion in 2017 to EUR 30 billion in 2022, with this trend being expected to further continue (ibid.). Under the ETS carbon emissions were reduced by 10 percent between 2005 and 2012 in the EU with no significant effect on employment or profits (Dechezleprêtre and Nachtigall and Venmans 2023, p. 1).

There are 10,000 installations included which make up around 40 percent of the EU's emissions including Iceland, Liechtenstein and Norway as participating countries (European Commission 2024). These installations belong to 3,515 companies of which 'the top 30 (representing less than 1 percent of the total) emitted more than 50 percent of the total emissions covered' by the ETS (Tamellini 2023). These top 30 are essentially four sectors: power production, steel and cement production as well as refining and petrochemicals (ibid.). The ETS covers CO2 emissions from electricity and heat generation, energy-intensive industry sectors such as oil, metals, cement, lime, glass, ceramics, pulp, paper and certain chemicals as well as aviation and maritime transport (European Commission 2024 a). Carbon dioxide is not the only greenhouse gas covered but the ETS also includes nitrous oxide which is related to the production of fertilisers and PFCs from the production of aluminium (ibid.). There is a large overlap with the targeted product range of CBAM that focuses on iron, steel, aluminium, electricity, fertiliser, hydrogen and cement (European Parliament and Council 2023).

For parties to the Paris Climate Agreement, it is possible to use carbon pricing and the creation of carbon markets as part of their strategy to achieve their Nationally Determined Contributions (NDCs) (UNFCCC 2024). A country's NDCs include a detailed plan on emission reduction strategies and targets as well as descriptions on climate change adaptation methods (ibid.). Two-thirds - which equals 100 countries - of the submitted NDC proposals consider carbon pricing as a tool to lower greenhouse gas emissions (ibid.). Using carbon pricing on a large scale can reduce climate change related costs of up to 32 percent until 2030 (ibid.).

Currently there are 110 carbon pricing initiatives fully implemented globally, 53 national and 40 subnational initiatives are either implemented or planned (World Bank Group 2024 a). In 2024, carbon pricing mechanisms covered 12.8 gigatonnes of CO2-equivalent, which equals 24 percent of global greenhouse gas emissions from that year (World Bank Group 2024 b). The European Union mainly uses their emissions trading system that covers about 2.59 percent of global emissions (ibid.).

The effectiveness of carbon markets depends on several distinctive factors throughout the policy design phase (see Barnes 2021). The level and scope of carbon pricing, coherence across different schemes and the international dimension, government credibility and social justice, influence the long-term effectiveness of carbon pricing policies (ibid.). The price for carbon has to be high enough to change companies' behaviour (Barnes 2021, p. 18) and once the price for implementing reduction action is lower than the carbon price, changes can be expected (ibid., p. 19).

The European ETS hardly meets any of these conditions as discussed earlier, mainly because of its allocation of free allowances. However, the central argument for this procedure is the risk of carbon leakage, having companies outsource their installations and production processes to third states in order to circumvent EU regulations and eventually profit from cost benefits through this practice (European Parliament and Council 2023). As a way of making carbon markets more effective and at the same time preventing carbon leakage, carbon border adjustment mechanisms were introduced.

When looking at the broader picture of research on carbon markets and more specifically on work concerning carbon border adjustment mechanisms, the majority of publications originate in the United States and Europe, particularly in Germany (Zhong and Pei 2023, p. 5), which also shows a lack of CBAM research from 'developing countries' (ibid.). Carbon leakage, competitiveness/competition, trade and climate change are among most prominent issues in CBAM research (ibid.) and most of the studies discuss direct effects of CBAMs like variations in economic effects due to a reduction of carbon leakage (Zhong and Pei 2023, p.6). Indirect effects of CBAMs such as enhanced climate ambitions of countries are mainly analysed through game-theoretic models (Zhong and Pei 2023, p.7). According to Zhong and Pei, 21 of 24 ex-

ante studies find that CBAM reduces carbon leakage and 25 of 28 ex-ante studies find that CBAM reduces loss in competitiveness (ibid.). Further, issues of fairness remain a topic in CBAM research: On the one hand, industrialised countries use CBAMs to protect fair competition while on the other hand, developing countries consider equal emission costs as unfair, due to the historic responsibility and current capabilities of developed countries (Zhong and Pei 2023, p. 13).

Despite its weaknesses, the Emissions Trading System is a useful tool in European climate politics. Yet, it is in urgent need of a reform to actually set market-based incentives for reducing emissions through a higher and effective pricing scheme on allowances and the phase out of free allocations. With explaining the dynamics of carbon markets as well as the functioning of the European Emissions Trading System, this chapter built the final and most specific part of the necessary theoretical background. Understanding carbon markets and in particular the European Emissions Trading System are the starting point for approaching the European Carbon Border Adjustment Mechanism and making sense of the background and system it is closely connected to.

The Carbon Border Adjustment Mechanism is a carbon pricing tool covering the embedded emission of iron, steel, aluminium, cement, electricity and hydrogen that are imported by the EU from third state manufacturers (European Parliament and Council 2023). Starting in October 2023, EU importers are obliged to calculate and report the embedded emissions of CBAM-goods to a central ‘CBAM Transitional Registry’ by the European Commission quarterly (ibid.). Access to this registry is granted through ‘National Competent Authorities’ (NCAs) that are responsible for implementing CBAM (ibid.). Importers have to register with their respective NCA in advance (European Parliament and Council 2023). The Commission provides detailed information, tutorials and workshops (ibid.) on how to calculate embedded emissions and also developed an IT tool to support importers with their calculations (ibid). During the transitional phase importers are free to choose a method for this but after, the Commission defines a single uniform method (that can be applied already) (ibid.). From 2026 on EU importers of iron, steel, aluminium, cement, electricity, fertiliser and hydrogen are obliged to calculate the embedded emissions and buy CBAM certificates from their NCA (ibid.). The price of CBAM certificates will be calculated depending on

the average auction price of EU ETS allowances as in €/tonne of CO2 emitted (ibid.). Tying CBAM allowances to the EU ETS ensures that carbon prices for imported goods are equal to those within the Union, avoiding discrimination against third state exporters (and eventually compliance with regulations of the World Trade Organization (WTO)). Importers will hand in and surrender the respective amount of CBAM certificates via a CBAM registry annually starting in May 2027 (ibid.). The verification of this data on embedded emissions by an independent entity will be mandatory from then on (ibid.). There are several approaches to enforce the implementation of CBAM by the European Commission but also some exceptions to this procedure and CBAM in general that will be discussed in more detail in chapter six of this thesis.

The main purpose of CBAM is to minimise and prevent carbon leakage (ibid.) while at the same time it works as competitiveness protection through changing relative prices between domestic goods and imports (Zhong & Pei 2023, p. 8). The goal is to restore competitiveness of the EU which was imbalanced due to unilateral carbon policies (ibid.), as the price for imported goods are equalised to domestic prices (that are under carbon regulations) (ibid.).

4. The Brussels Effect

Building the theoretical foundation of the subsequent analysis: 'the term "Brussels Effect" refers to the EU's unilateral ability to regulate the global marketplace. [...]' (Bradford 2020, p. 1) and describes 'the phenomenon where the market is transmitting the EU's regulations [...]' (ibid.). Thus, the Brussels Effect describes a phenomenon of global regulatory influence through effects of externalisation due to market forces (ibid., p. 2). There are two varieties to this effect, either de facto or de jure. The de facto Brussels Effect describes a voluntary adjustment to EU regulations by global corporations without actual legal obligations imposed by the respective foreign government (ibid.). The de jure Brussels Effect is an extension of this. After having adjusted to EU-style regulations, global corporations have the incentive to lobby for a formal regulatory response by their jurisdiction, to secure their competitiveness against local companies that do not export to the EU (ibid.). Bradford identifies five necessary conditions for the Brussels Effect to occur: *Market Size*, *Regulatory Capacity*, *Stringent Standards*, *Inelastic Targets*, *Non-Divisibility* (ibid., p. 25).

The EU's single market provides the foundation 'to its ability to externalize its regulatory measures outside of Europe' (ibid., p. 26), thus, the bigger the *Market Size* , the more likely it is for regulations to be externalised in third states (ibid., p. 27). *Regulatory Capacity* describes a jurisdiction's strength to develop and administer regulations (ibid., p. 30). Combined with the political will, a jurisdiction has to advocate for *Stringent Standards* (ibid., p. 37). '"*Inelastic Targets*" refer to products or producers that are non-responsive to regulatory change and hence tied to a certain regulatory regime' (ibid., p. 48). Lastly, *Non–Divisibility* describes the actual standardisation and adjustment to the regulatory requirement (opposed to specific adjustments to the production) across different markets (ibid., p. 53). These five conditions will be explained in further detail in the following.

Market Size

'The greater the ratio of exports to the jurisdiction relative to sales in the home and third-country market, the more likely the Brussels Effect will occur' (ibid., p. 27). *Market Size* is closely related to economic power as well as 'global regulatory influence' (ibid., p. 26). A market's power correlates with its attractiveness for relevant actors compared

to alternative markets available (ibid.). This is especially relevant for consumer markets with wealthy and numerous potential consumers, as they bear particularly high opportunity costs when demand in the corporation's home market is low (ibid., p. 27). 'The greater the ratio of exports to the jurisdiction relative to sales in the home and third-country market', the more likely the Brussels Effect will occur (ibid.). When access to a market is perceived to be valuable for a company, the effect of market power is strengthened (ibid.).

The EU's market power is more restricted in cases where there are other equally suitable destination markets for goods (Bradford 2020, p. 29). Further, regulatory power is easier to exert externally when the goal is to prevent imports to one's own market while limiting exports to certain third countries is more difficult to realise (ibid., p. 30). For the European Union, its main source of power stems from 'its ability to offer conditional access to its large and valuable market' (ibid.).

These theoretical considerations lead to the following hypothetical prediction for this thesis: The larger the EU's *Market Size* for the respective goods under CBAM, the more likely externalisation is to occur.

Regulatory Capacity

Large *Market Size* alone is not sufficient to project regulatory preferences onto others as it is not intrinsic but rather a conscious decision to do so (ibid.). Thus, to actually translate *Market Size* into global regulatory influence, there must be institutions that are vested with *Regulatory Capacity* (ibid.). This second necessary condition of *Regulatory Capacity* is defined as 'a jurisdiction's ability to promulgate and enforce regulations' (ibid., p. 31). An essential part of this are significant financial resources and resilience thus, being able to impose sanctions and exclude non-compliant companies from one's market as well as regulatory expertise (ibid.). Hence, *Regulatory Capacity* is not only about implementation but also about policy-making. Further, *Regulatory Capacity* does not develop overnight but takes time to evolve and is related to GDP growth (ibid.).

The EU's *Regulatory Capacity* is based on its 'institutions' significant regulatory expertise, coherence of policy making, and expansive sanctioning authority' (ibid.).

Internally, the possibility of infringement procedures has Member States being compliant with their mandate and duties which eventually strengthens the EUs *Regulatory Capacity* (ibid., p. 33). The EUs policy-making is further legitimised by extensive technical expertise of commission staff and officials 'and contributes to an aura of objectivity and neutrality that enhances their authority' (ibid.). A core element for extensive *Regulatory Capacity* is a shared identity of the Commission staff of which the majority identifies as European (ibid.) and in such areas of limited expertise, the EU established European Regulatory Agencies to minimise weak spots and strengthen its ability to develop and implement regulations (ibid.).

However, even though the competences of EU institutions did grow significantly over the years, through power transfer from Member States to the EU (ibid., p. 34), its *Regulatory Capacity* is not coherent across policy areas (ibid., p. 36). In areas where the EU enjoys exclusive competences that are not shared with Member States, its *Regulatory Capacity* is the strongest (ibid.).

The working-prediction that derives from these theoretical arguments is: the stronger the EU's *Regulatory Capacity* to implement CBAM, the more likely externalisation is to occur.

Stringent Standards

In addition to *Market Size* and *Regulatory Capacity*, Bradford establishes a third necessary condition for the Brussels Effect. For both of the first two conditions to translate into global regulatory authority, *Stringent Standards* supported by actual political will have to be established (ibid., p. 37). Not only do *Stringent Standards* foster European integration but they are also related to 'ideology' and 'process' (ibid.). 'Ideology' refers to the 'Europeans' greater faith in government as opposed to markets to generate fair and efficient outcomes' (ibid.). While 'process' is described as 'the relative importance of public regulation over private litigation and lower threshold for intervention by regulators in cases of uncertainty' (ibid., p. 39).

'Ideology' is located in between the field of tension of market versus government with the state generally enjoying greater public trust in the European Union (ibid.). This and the following observations and comparisons by Bradford are all related to the

perceptions and activities in the United States that follow a market-oriented narrative (ibid.). The European preference for 'high levels of regulatory activity' (ibid.) not only reflects their commitment to a social market economy and sustainable development but is constitutionally enshrined in the Treaty of Lisbon after all (ibid.). An additional layer to the EU's tradition of *Stringent Standards* is rooted in several Member States' history of strong governments and market regulation (ibid., p. 40). France, Germany, the Scandinavian countries as well as Eastern European countries that experienced communism, among others, all embrace the role of the state over market powers (ibid.). '[...] most EU member states support government intervention as a way to ensure a more equitable distribution of wealth among their citizens, even if such sentiments arise for varying historic reasons.' (ibid.). The last element of the EU's regulatory ideology consists of the European political elites who even though they are divided share a common perspective on market regulation and social protection (ibid., p. 41).

The second factor of 'Process' includes the preference for administrative policy-making and a tendency for precaution in the European Union (ibid.). Again, in contrast to the United States, the EU follows an approach of relying on the government to pass ex ante regulations and being preventive in their rule-making by adopting regulations 'before harm occurs' (ibid., p. 42). The EU's policy-making is characterised by large portions of technocracy and agency expertise rather than expecting courts to take ex post decisions (ibid.). Bradford identifies several underlying causes for this tendency, one being that financial incentives to sue for damages in the EU are comparatively modest in contrast to the US (ibid.). The other being, that there is a tradition to give in to public pressure demanding administrative regulation in the EU (ibid.). Lastly, Europeans tend to erase even distant or uncertain risks especially in areas of health and environment which is unlike the US tort system that would allow 'the harm to materialize before any action can be taken' (ibid.).

However, the EU's preference for precautionary administrative rule-making over tort litigation through jurisprudence, does not necessarily imply that courts are irrelevant, yet the ruling of the European Court of Justice has paved the way for many policies and regulations (ibid., p. 43). Another process-driven aspect to *Stringent Standards* is the 'precautionary principle'. It emerged during the 1970s and was officially enshrined in

the Treaty of Maastricht in 1992 (ibid., p. 45). 'The precautionary principle enables decision-makers to adopt precautionary measures when scientific evidence about an environmental or human health hazard is uncertain and the stakes are high' (European Parliament 2015). Yet, the EU's ability for global regulatory authority and *Stringent Standards* is limited in instances where member states differ in their regulatory preferences or when other states prefer even higher standards than the EU (Bradford 2020, pp. 46-47).

Thus, the logic of this theoretical framework leads to the following prediction: the stronger the EU's preference for an ambitious CBAM regulation is, the more likely externalisation is to occur.

Inelastic Targets

The question of elasticity in this context is concerned with how strongly EU law applies or if it can easily be circumvented. Moving to a different location will not allow the manufacturer to evade EU standards and regulations (ibid., p. 49), they cannot simply shop for a less regulated market without losing access to the single market (ibid.). "*Inelastic Targets* refer to products or producers that are non-responsive to regulatory change and hence tied to a certain regulatory regime" (ibid. p. 48). Thus, the decisive factor for *Inelastic Targets* is whether or not they are bound within the regulating jurisdiction (ibid.). 'The location of the consumer within the EU, opposed to the location of the manufacturer, determines the application of EU regulation to the targeted product' (ibid.). Examples for *Inelastic Targets* are typically consumer markets including health and safety opposed to financial or capital markets that are highly elastic and mobile (ibid.). Elasticity is an inherent feature of the target itself and can hardly be influenced by governmental action (ibid., p. 53).

In relation to the chosen policy of CBAM and the goods it targets the following prediction derives: the stronger the targeted goods under CBAM are tied to EU regulations, the more likely externalisation is to occur.

Non-Divisibility

The fifth necessary condition for the Brussels Effect is that of *Non-Divisibility*. While the four preceding requirements focused on intra-European factors to establish the

necessary circumstances for the EU to be a global regulatory authority, *Non-Divisibility* describes the manufacturers' or states' choice to either standardise production/ products according to EU regulations or individualise production for different markets/requirements (ibid.). In other words, do manufacturers or third states actually adopt EU regulations and adapt their respective products, production or regulations accordingly? However, this standardisation of products, production and/ or legislation is not only implemented for the European single market but undivided and applied worldwide (ibid.). 'Global standards emerge only when corporations voluntarily opt to extend the regulatory requirements of the most stringent regulator to their global operations' (ibid.).

There are three dimensions to this condition namely legal, technical and economic *Non-Divisibility*. 'Legal *Non-Divisibility* refers to legal requirements and remedies as drivers of uniform standards' (ibid., p. 56). Divisibility is restricted or blocked by law usually through the most demanding jurisdiction (ibid.). This applies independently from a company's legal head office and is especially relevant in cases of merger and cartel as the most stringent regulation decides over the fate of business plans or structures (ibid.). In other words, legal Non-Divisibility aims at addressing and closing potential loopholes or activities of circumvention on a policy design level.

'Technical *Non-Divisibility* refers to the difficulty of separating the firm's production or services across multiple markets for technological reasons' (ibid., p. 57). For instance, global tech-enterprises like Google or Facebook have to comply with European regulations on data protection, as it is almost impossible to determine with certainty which of their users are covered by EU law (ibid., p. 58).

In some cases, even though legal or technical divisibility of production would be possible, they would not be cost beneficial from an economic point of view (ibid.). This economic *Non-Divisibility* is the most common reason for manufacturers to decide for a standardised production in accordance with the most stringent regulation across all markets (ibid.). Standardising products and production processes saves costs in various ways and paves the way for beneficial scale economies (ibid., p. 59). A uniform standard simplifies manufacturing itself or of a product leading to lower error costs and more available resources for other aspects like R&D, marketing, distribution or testing,

while this allows for greater flexibility and no accurate prediction of demand for each market is needed (ibid., pp. 60-61). Besides scale economies, global enterprises and brands consider *Non-Divisibility* to facilitate and protect their reputation (ibid., p. 61). Lastly, pressure from civil society leads companies to globally comply with the most stringent regulation present (ibid., p. 62).

The last of the working-predictions is that of: the more prone the production processes of CBAM goods are to standardisation, the more likely externalisation is to occur.

Condition	Prediction	Perspective	Dimensions of Analysis
Market Size	The larger the EU's *Market Size* for the respective goods under CBAM, the more likely externalisation is to occur.	External (Third states) Top-5-exporting non-eu-countries +If not already included UK, Türkiye, China, US, Switzerland	For each CBAM good: Export share into Europe Share of total export volume
Regulatory Capacity	The stronger the EU's *Regulatory Capacity* to implement CBAM, the more likely externalisation is to occur.	Internal (EU)	Financial resources Resilience Sanctioning authority Regulatory expertise Coherence in policy-making Infringement procedures
Stringent Standards	The stronger the EU's preference for an ambitious CBAM regulation, the more likely externalisation is to occur.	Internal (EU)	CBAM Policy Design Stances of EU parliament political groups Member States' stances
Inelastic Targets	The stronger the targeted goods under CBAM are tied to EU regulations, the more likely externalisation is to occur.	Meta	EU consumer market of CBAM goods & environmental standards State of carbon leakage WTO compliance and stance Discarded policy alternatives
Non-Divisibility	The more prone the production processes of CBAM goods are to standardisation, the more likely externalisation is to occur.	Meta	Legal Non-Divisibility Technical Non-Divisibility Economic Non-Divisibility

Table 1

5. Methodology & Research Design

In order to answer the main research question of this paper of how and to what extent could the Carbon Border Adjustment Mechanism trigger externalisation, a number of methodological choices and decisions were made to develop the most appropriate and suitable research design. These very considerations about the overall research approach of conducting a policy analysis, the data collection method that is qualitative and descriptive, the data analysis method, ex post foresight study, as well as the research limitations will be explained and discussed in this chapter. The analysis is based and revolves around Anu Bradfords book 'The Brussels Effect: How the European Union Rules the World' from 2020 with its theory being adopted for analysis. The initial objective of this paper is to conduct an ex post foresight study on the CBAM policy, making predictions about policy consequences as future outcomes. Thus, this thesis uses a theory-application approach and not a theory-testing design.

Using a qualitative approach is considered to be the most feasible and suitable design choice to not only answer the research question but also in light of the overall research interest of this paper. It further allows for an in-depth analysis of the selected policy, with the primary intent of this paper being explanation and not abstraction. The analysis applies the existing Brussels Effect theory to explain and anticipate effects (of externalisation) of the CBAM policy, this is to be distinct from a theory-testing approach which is not used here. Narrowing down the research question, the analysis focuses on de facto effects of externalisation that include the voluntary adaptation of EU standards by corporations and their production processes.

Since the analysis will be literature-based, existing research on the topic, official EU publications, policy documents and press releases as well as media reports from specialised news outlets and existing research are used. Relevant search engines and portals are google scholar, u:search and EUR-Lex. The time frame for analysis includes the whole policy-cycle from the evaluation phase and the first release of the 'Impact Assessment Report' from July 2021 on CBAM, covering the formulation and adoption phase, up to the evaluation phase again with an official feedback loop in July 2023. This time frame allows to consider even early stages of policy-making which

builds an essential foundation for analysis and helps to understand later decisions as well as future policy impacts.

The analytical logic follows that of a foresight study even though it is conducted at an ex post stage where the policy left the development phase and already entered into force. Voros developed a generic foresight model of ‘Inputs’ and ‘Analysis’ which will be the background section of this paper, ‘Interpretation’ and ‘Prospection’ which will be the empirical part here and lastly ‘Outputs’ that can be find in the discussion chapter of this thesis (Voros 2003, p. 9).

These considerations lead to the following framework that is used as a basis for analysis. Bradford identifies five necessary conditions: *Market Size, Regulatory Capacity, Stringent Standards, Inelastic Targets and Non-Divisibility* that have to be fulfilled for the Brussels Effect and externalisation to occur. Even though all these conditions have to be met and build on one another, not all of them follow a binary logic. While *Market Size, Regulatory Capacity* and *Stringent Standards* can be strong or weak, the conditions of *Inelastic Targets* and *Non-Divisibility* are binary. Details and explanations on each condition will be provided in the subsequent chapter. Each necessary condition is analysed in relation to a working-prediction that is directly derived from Bradfords theory.

For the first condition of *Market Size* an external perspective on third states, namely the top-five-exporting-non-EU countries for each CBAM good is chosen. If not already among the top-five, China and the United States are included as the EU biggest trading partners as well as the United Kingdom, Türkiye and Switzerland due to their traditionally close relations to the EU. For each CBAM good the export share to Europe and the European share of the total export volume is assessed. Due to data availability, it is not only EU but all European countries that are considered but they still give an impression of the trade relations. Possible manifestations for this condition are either a high or low export share to Europe and for the second layer of analysis the respective CBAM sector can either have a high or low share of the total export volume. Central sources for this are the Observatory of Economic Complexity as well as existing research with foresight studies on projected future demands.

Based on the above-mentioned prediction, the condition of the EU's *Regulatory Capacity* is analysed. It is operationalised into five layers, the first one being financial resources with the external imports of the EU being either high or low for the respective CBAM sector. The EUs resilience and sanctioning authority are either high, medium or low concerning the Single Market Programme and CBAM policy sanctioning mechanisms. The regulatory expertise can as well be high, medium or low depending on the input of the CBAM expert group. The coherence in policy-making is measured through individual Member States' CBAM initiatives that are either strong, medium or weak. Lastly the state and use of infringement procedures is analysed and manifested as being either strong, medium or weak. Central sources for this chapter are again trading data from the Observatory of Economic Complexity (OEC), the CBAM policy document from the Official Journal of the EU, official EU publications and websites as well as existing research on policy-coherence and infringement procedures.

The third condition of *Stringent Standards* also uses an internal perspective onto the EU, analysing the CBAM policy design, stances of the biggest groups of the EU parliament as well as Member State stances. This transfers to the political will on policy design, party and Member State level which can be either strong, medium or weak. Again, the CBAM policy document, websites of EU parliamentary groups and the recording of the final CBAM Council meeting are deemed to be central sources here.

The condition of *Inelastic Target* and the corresponding working-prediction are analysed from a rather abstract perspective. This chapter analyses the EU consumer market of CBAM goods and environmental standards, the state of carbon leakage, CBAM compliance with the WTO's regulation and the organisation's stance as well as discarded policy alternatives to CBAM. The range of possible outcomes varies from CBAM goods being either strongly, moderately or weakly bound to the regulatory regime of the EU. Here again, the official legal document of the CBAM regulation is a central source as well as WTO press releases, the CBAM impact assessment report and existing research on carbon leakage.

Lastly, just as the previous conditions, *Non-Divisibility* can only be predicted as a condition since CBAM only entered into force last year 2023 and is currently in its transitional phase that does not yet necessarily require adaptations. This foresight

uses an external perspective on third states and mainly analyses stakeholder opinions on CBAM to anticipate if production processes remain unchanged without any Brussels Effect or if production processes are standardised to comply with CBAM and show a strong Brussels Effect. In order to analyse this, the CBAM policy document, the CBAM impact assessment document and feedback from the EU Commissions 'Have your say' - platform are worked with along the three domains of legal, economic and technical *Non-Divisibility.*

This approach and design naturally come with research limitations. This thesis solely analysed the potential effects of CBAM on large trading partners as well as partners for which the EU is an important market. Despite this limiting the generalisation of the results (to trading partners for whom the EU is not as relevant), the potential for carbon leakage and/ or competition distortions is highest which eventually is the target of CBAM.

Condition	Possible Manifestations/ Range	Central Sources
Market Size	High export share into Europe Low export share into Europe Sector with high share of total export volume Sector with low share of total export volume	Observatory of Economic Complexity Foresight studies (on projected future demands) of existing research
Regulatory Capacity	External imports from outside the EU High import share of EU Low import share of EU Single Market Programme & policy sanctioning mechanisms High /medium/ low CBAM expert group input High /medium/ low Individual Member States CBAM initiatives Strong /medium/ weak State/usage of infringement procedures Strong /medium/ weak	Observatory of Economic Complexity CBAM policy document Official EU publications Official EU websites existing research: policy coherence, infringement procedures
Stringent Standards	Political will on: Policy design level Party level Member States level strong/medium/weak	CBAM policy document Websites of EU Parliament political groups Video of final CBAM Council meeting
Inelastic Targets	CBAM-goods are either: Strongly bound to EU regulatory regime Moderately bound to EU regulatory regime Weakly bound to EU regulatory regime	CBAM policy document WTO website CBAM impact assessment document Existing research: Carbon leakage
Non-Divisibility	Non-Divisibility is addressed in CBAM policy document Production processes are individualised	CBAM policy document CBAM impact assessment document Feedback from EU Commission 'Have your say' - platform

Table 2

6. The EU's Carbon Border Adjustment Mechanism and Externalisation according to the Brussels Effect

The following chapter analyses externalisation effects of the EU Carbon Border Adjustment Mechanism based on Bradford's theory of the Brussels Effect. Based on the five necessary conditions of *Market Size*, *Regulatory Capacity*, *Stringent Standards*, *Inelastic Targets* and *Non-Divisibility* as well as the before-mentioned analytical framework, the potential for the EU's global regulatory authority for this policy is examined.

a. Market Size

The following chapter analyses the EU's *Market Size* regarding the goods - namely iron and steel, aluminium, cement, electricity, fertiliser and hydrogen - covered by the CBAM. Based on the working-prediction of 'The larger the EU's *Market Size* for the respective goods under CBAM, the more likely externalisation is to occur' for this condition, trade relations with third states concerning those CBAM-goods are the centre of attention. Therefore, most likely cases as in the top-five-exporting non-EU-countries for each good are chosen for analysis, due to (scientific) relevance as well as data availability. The five overall most relevant trading partners of the EU, in terms of import and export share for 2022, are: the United States, the United Kingdom, China, Switzerland and Türkiye (Eurostat 2022). This illustrates the overall economically, politically and socially most significant trade relations the EU has across sectors. Thus, if not already among the top-five exporting countries for CBAM-goods, these states were included, too, to add a comparative perspective and broader picture of the topic.

The following table 3 shows the top-five-exporting non-EU-countries of each CBAM-good in descending order. It provides information about the total export share of the respective countries as well as the share of exports into the EU and the EU's relative position of other export destinations for the respective good and country. Table 2 again shows the top-five-exporting non-EU-countries of each CBAM-good as well as the

share of the respective CBAM-good to the total export volume of the country. Trade-data for Russia has limited relevance since the imposition of sanctions by the European Union against the country, due to Russia's war of aggression against Ukraine.

Iron & Steel: With a total export volume of USD 69.8 billion in iron and steel, China leads the list. USD 7.38 billion of this share is exported to Europe, which leaves the latter being third after Asia and Africa. Iron and steel exports make 1.87% of all exports leaving China. Of its USD 35.7 billion in iron and steel exports, Japan sends USD 2.08 billion to Europe, its third biggest export destination after Asia and North America. 4.91% of all exported goods from Japan are iron and steel. South Korea sends USD 5.05 billion of its total USD 29 billion iron and steel exports to Europe, which makes it the second biggest customer after Asia. The share South Korea exports in iron and steel makes 4.11%. For Indonesia, Europe again is the second biggest customer after Asia, with an export share of USD 1.21 billion compared to a USD 28.8 billion total export volume for iron and steel. This sector makes up for 9.11% of all exports from Indonesia. The US is the fifth biggest iron and steel exporter with a total volume of USD 21.2 billion and a European share of USD 1.11 billion, leaving it third after North America and Asia as the largest export destination. Exporting iron and steel makes up for 1.09% of all goods leaving the US.
With an export share of about 50% each, Europe is the biggest export destination for the United Kingdom, Switzerland and Türkiye. For the United Kingdom iron and steel exports make up for 1.91% of all exports, while for Switzerland it is 0.54% and 6% for Türkiye.

Aluminium: China again is the top exporting country with a total volume of USD 42.5 billion and a USD 7.72 billion share reaching Europe which makes it the third biggest export destination after Asia and North America. Aluminium exports equal a share of 1.14% of all exports from China. The US have an export volume of USD 14.2 billion of which USD 1.06 billion are exported to Europe, making it the third biggest destination after North America and Asia. 0.73% of all exports are associated with aluminium. USD 4.83 billion of Türkiye's total USD 6.74 billion aluminium exports are destined for Europe which makes it the biggest customer. At the same time, the export share of this sector is 2.57%. South Korea exports aluminium worth USD 5.82 billion while a share

of USD 632 million are sent to Europe, making it again the third most popular destination after Asia and North America. For South Korea, exports in this sector have a share of 0.83% of the total volume. Lastly, the United Kingdom exports USD 3.75 billion in total with a European share of USD 2.27 billion. Europe is the biggest export destination for aluminium. 0.8% of all exports are related to aluminium. Switzerland exports most of its aluminium, 87% of the total volume, to Europe, while aluminium exports make up for 0.79% of all exports.

Cement: In 2022, Türkiye was the leading export-country for cement with a total volume of USD 1.76 billion of which USD 327 million were exported to Europe. This makes Europe third after North America and Asia. Cement exports make up for 0.67% of the total export volume. Vietnam comes second with an export volume of USD 1.54 billion and a share of USD 23 million that is exported to Europe, leaving it in fifth place of biggest export destinations of Vietnam. 0.39% of all exports are related to cement in this country. The United Arab Emirates exported cement worth USD 643 million of which USD 2.72 million reached Europe, leaving it again in fifth place. Of the total export volume 0.16% are made up of cement. Egypt exports, of its total USD 611 million in cement, USD 23 million to Europe, making it the fourth biggest export destination of this sector. Cement exports make up 1.13% of the total export volume. Yet, of Iran's USD 549 million in cement exports and an export share of 3.46%, none of it is destined for Europe.
China exports about 5% of its cement to Europe, making it the third largest customer. The United States export 1% (fifth position), the United Kingdom 56% (first position) and Switzerland 9% (second position) to Europe.

Electricity: The biggest exporter of electricity is Switzerland with USD 9.26 billion that is exported solely to Europe and has a share of 2.3% for electricity in its total export composition. Second is the United Kingdom with USD 4.75 billion and again exports entirely to Europe. The export share for electricity makes up for 1.01% of the total volume. Norway also exclusively exports to Europe with a share of USD 4.74 billion, with electricity equalling for 1.66% of the total export. Canada is the fourth biggest exporter with a total volume of USD 4.4 billion and a share of USD 1.88k to Europe, making it second after North America. Electricity exports equal 0.75% of Canada's total

export volume. Even though Laos exported USD 2.38 billion of electricity and with electricity exports making up for 25.4% of all exports, none of it reaches Europe.
Neither China nor the United States export any of their electricity to Europe, while for Türkiye 46% of electricity exports are sent to Europe. These exports account for 0.11% of the total volume for Türkiye.

Fertiliser: For fertiliser, Russia is the biggest exporter with a total value of USD 18.7 billion of which USD 2.91 billion are destined for the European market, which leaves it in fourth position of the biggest customers. These exports account for 3.85% of all goods leaving Russia in 2022. Canada exported USD 14.5 billion in fertiliser and shipped USD 729 million to Europe, its fourth biggest export destination. Fertiliser exports make up for 2.48% of the total export volume. Third biggest exporting country for fertiliser is China with a total value of USD 12.7 billion and USD 419 million destined for Europe, its fifth biggest customer. Of the total export volume fertiliser equals 0.34%. The United States exported USD 741 million of its total volume of USD 8.19 billion to Europe, its fourth biggest export destination for fertiliser. Exports of this sector account for 0.42% of the total volume. Lastly, Morocco exported USD 7.92 billion in fertiliser of which USD 783 million ended up in Europe, its fourth biggest export destination for this sector. Fertiliser exports have a share of 16.9% of all Moroccanian exports.
For the United Kingdom and Türkiye, Europe is their top destination for fertiliser exports with a share of 54% and 53% respectively. Switzerland exports 16% of its total volume to Europe. The share of fertiliser exports in relation to the total export volume is 0.14% for the United Kingdom, 0.03% for Switzerland and 0.4% for Türkiye.

Hydrogen: With hydrogen exports worth USD 3.34 billion, China is the biggest exporting country. The share for the European market is USD 377 million, second biggest customer after Asia. These exports make up to 0.09% of the total export volume. The United States exported USD 2.35 billion in hydrogen and sent USD 333 million worth of it to Europe, its second biggest export destination after Asia. Hydrogen exports account for 0.12% of all exports. Norway exports USD 807 million of its USD 1.01billion in hydrogen to Europe, the biggest export destination and an export share of 0.36%. Of Qatar's USD 922 million in hydrogen exports, USD 60.7 million end up in Europe, which leaves it in second place after Asia. 0.77% of all exports are related to the hydrogen sector. Lastly, Vietnam exported hydrogen worth USD 744 million and

USD 142 million of it to Europe, its second biggest market after Asia. Hydrogen exports have a share of 0.19% of the total volume.
The European market is a top destination for hydrogen exports for the United Kingdom 70%, Switzerland 87% and Türkiye 70%.

	Iron & Steel	Aluminium*	Cement	Electricity	Fertiliser	Hydrogen
Top-5-exporting countries (non-eu countries) Total export volume Country Share exported to europe (share compared to other regions)	$69.8B **China** $7.38B to Europe (3rd after Asia & Africa)	$42.5B **China** $7.72B to Europe (3rd after Asia & North America)	$1.76B **Türkiye** $327M to Europe (3rd after North America & Asia)	$9.26B **Switzerland** $9.26B to Europe (1st)	$18.7B **Russia** $2.91B to Europe (4th after Latin America, Asia, North America)	$3.34B **China** $ 377M to Europe (2nd after Asia)
	$35.7B **Japan** $2.08B (3rd after Asia & North America)	$14.2B **US** $1.06B to Europe (3rd after North America & Asia)	$1.54B **Vietnam** $23M to Europe (5th)	$4.75B **UK** $4.75B to Europe (1st)	$14.5B **Canada** $729M (4th after North America, Asia & Latin America)	$2.35B **US** $333M to Europe (2nd after Asia)
	$29B **South Korea** $5.05B (2nd biggest after Asia)	$6.74B **Türkiye** $4.83B to Europe (1st)	$643M **UAE** $2.72M to Europe (5th)	$4.74B **Norway** $4.74B to Europe (1st)	$12.7B **China** $419M to Europe (5th)	$1.01B **Norway** $807 to Europe (1st)
	$28.8B **Indonesia** $1.21B (2nd after Asia)	$5.82B **South Korea** $632M to Europe (3rd after Asia & North America)	$611M **Egypt** $23M to Europe (4th after Africa, North America & Asia)	$4.4B **Canada** $1.88k to Europe (2nd after North America)	$8.19B **US** $741M to Europe (4th after North America, Latin America & Asia)	$922M **Qatar** $60.7M (2nd after Asia)
	$21.2B **US** $1.11B (3rd after North America & Asia)	$3.75B **UK** $2.27B to Europe (1st)	$549M **Iran** $0 to Europe	$2.38B **Laos** $0 to Europe	$7.92B **Morocco** $783M to Europe (4th after Asia, Latin America & Africa)	$744M **Vietnam** $142M (2nd after Asia)
	$8.95B **UK** $4.26B to Europe (1st) $2.19B **Switzerland** $1.62B to Europe (1st) $15.7B **Türkiye** $6.6B to Europe (1st)	$3.16B **Switzerland** $2.77B to Europe (1st)	$217M **China** $11.4M to Europe (3rd after Asia & Africa) $186M **US** 2.07M to Europe (5th) $42.7M **UK** 23.7M to Europe (1st) $126M **Switzerland** $10.8M to Europe (2nd after Israel)	$1.58B **China** $0 to Europe $982M **US** $0 to Europe $282M **Türkiye** $131M to Europe (1st)	$635M **UK** $342M to Europe (1st) $122M **Switzerland** $19.8M to Europe (3rd after Asia & Africa) $1.04B **Türkiye** $556M to Europe (1st)	$36.9M **UK** $26M to Europe (1st) $25.6M **Switzerland** $22.3M to Europe(1st) $31.6M **Türkiye** $22.2M to Europe (1st)

Table 3 (Authors own depiction; data from OEC 2022 - product profiles, *respective country profiles)

	Iron & Steel	Aluminium	Cement	Electricity	Fertiliser	Hydrogen
Top-5-exporting countries Share of respective sector of total export volume	1.87% **China**	1.14% **China**	0.67% **Türkiye**	2.3% **Switzerland**	3.85% **Russia**	0.09% **China**
	4.91% **Japan**	0.73% **US**	0.39% **Vietnam**	1.01% **UK**	2.48% **Canada**	0.12% **US**
	4.11% **South Korea**	2.57% **Türkiye**	0.16% **UAE**	1.66% **Norway**	0.34% **China**	0.36% **Norway**
	9.02% **Indonesia**	0.83% **South Korea**	1.13% **Egypt**	0.75% **Canada**	0.42% **US**	0.77% **Qatar**
	1.09% **US**	0.80% **UK**	3.46% **Iran**	25.4% **Laos**	16.9% **Morocco**	0.19% **Vietnam**
	1.91% **UK** 0.54% **Switzerland** 6% **Türkiye**	0.79% **Switzerland**	0.006% **China** 0.009% **US** 0.009% **UK** 0.031% **Switzerland**	0.042% **China** 0.05% **US** 0.11% **Türkiye**	0.14% **UK** 0.03% **Switzerland** 0.4% **Türkiye**	0.007% **UK** 0.006% **Switzerland** 0.012% **Türkiye**

Table 4 (Authors own depiction; data from OEC 2022 - country profiles)

Another layer of the EU's *Market Size* is not only its recent demand for external imports but also the projected future demand of those imported CBAM-goods for a long-term estimation. 'Looking forward, Europe is expected to have the world's third smallest growth in aluminium consumption after China and Asia, going from 12.7 Mt in 2020 to 17.5 Mt in 2030, although almost half of this growth will come from the Transport sector, a 15% from construction and a 12% from Packaging' (CRU International 2022, p. 19). Aluminium is included in the 2023 list of Critical Raw Materials by the Joint Research Center of the European Commission (Joint Research Center 2024). Critical Raw Materials are at the nexus of economic importance and supply risk, while Aluminium is used in all five strategic sectors such as renewable energy, electromobility, energy-intensive industry, digital, aerospace and defence (Joint Research Center 2023, p. 241) it also shows a high production concentration (Joint Research Center 2024 a). Critical Raw Materials are essential for achieving the EU's climate and digitalisation objectives as well as maintaining competitiveness (Joint Research Center 2024) and thus play an essential role for the single market in the long-term.

Electricity consumption is expected to rise from 2.900 terawatt-hours in 2021 to 3.700 terawatt-hours in 2030 (Schülde and Veillard and Weiss 2023) and until 2050 European power demand could reach up to 7.500 terawatt-hours (Chen et al. 2024). 'Electricity demand will increase by almost 20% [until 2030] compared to 2018 driven by the market uptake of technologies such as electric vehicles and heat pumps, and in spite of huge increase in energy efficiency' (European Network of Transmission System Operators for Electricity 2018, p. 6).

Fertilizers Europe, the EU's biggest business association annually publishes a 'Forecast of food, farming & fertilizer use in the European Union' (see Fertilizers Europe 2023, 2022, 2021, 2020, 2019). While for 2029 they estimated an overall change in consumption of plus 3.6% (ibid. 2019) they forecast a rise of 9% for 2033 (ibid. 2023).

Hydrogen was assessed for the critical raw materials list but not classified as one of such with a relatively low economic relevance and supply risk (Joint Research Center 2023, p. 241). Until 2050 it is estimated that the demand for hydrogen will lie between

58 to 71 megatonnes per year (Gulli et al. 2024) compared to the 2022 demand of 8.2 megatonnes of hydrogen (European Hydrogen Observatory 2024). ‘In Europe [...], the chemicals sector is projected to remain a significant driver of hydrogen demand, but new applications in sectors including steel and production of synthetic fuels for aviation, maritime, and heavy road transport are also expected to contribute significantly to demand growth (Gulli et al. 2024).

For iron and steel as well as for cement there are no clear estimations of future demand or forecasts for the European Union. However, all of these materials are projected to play an essential role either in ‘climate-resilient construction’ (Joint Research Center 2023, p. 162) or for future strategic technologies in the aerospace and defence production (ibid. p.178).

Connecting these findings with the prediction of ‘the larger the EU’s *Market Size* for the respective goods under CBAM, the more likely externalisation is to occur’, the following aspects stand out. The analysis suggests that the EU’s *Market Size* for CBAM goods now is especially relevant for the UK, Switzerland, Türkiye and Norway. For traditionally large trading partners such as China and the US, the EU is less of a relevant export destination and trading partner for CBAM goods in general. Additionally, the projected demand of the EU for these goods is estimated to rise which will potentially have the EU’s *Market Size* grow. Yet, large *Market Size* alone does not generate effects of externalisation, *Regulatory Capacity* to put the EU’s economic position into use for its CBAM policy, is also necessary and will be examined in the following.

b. Regulatory Capacity

The following chapter analyses the EU's *Regulatory Capacity* in relation to the Carbon Border Adjustment Mechanism. In order to gain a deeper understanding and holistic picture on this condition, the EU's ability to develop, implement and enforce this regulation is reviewed as these are essential factors for strong *Regulatory Capacity*. First, the EU's general legislative competences of this policy area are identified. Second, elements of *Regulatory Capacity* such as financial resources, resilience and sanctioning authority, regulatory expertise and coherence in policy-making are analysed to determine the actual manifestation of this condition.

Even though the Treaty on the Functioning of the European Union does specify on the competences and the extent of those for areas of application, it does not list climate policy as an individual area in any category (see European Union 2008) which raises questions about visibility and prioritisation. However, the Council of the European Union categorised it at the nexus of competition and economic and financial affairs (see Council of the European Union 2021; Council of the European Union 2022), with the latter council constellation having made the final decision on/ approval of the regulation on 15th March 2022 (Council of the European Union 2022). The CBAM regulation has fully completed the ordinary legislative procedure, with the European Parliament adopting the CBAM draft at first reading on the 18th April 2023 (European Parliament 2023). Overall, the European Union and its institutions are vested with strong *Regulatory Capacity* also in the domain of environmental and climate politics (see Lenschow 2021, Bradford 2020, Pollack and Roederer-Rynning and Young 2021, Jordan and Gravey and Adelle 2021).

The European Union has to have sufficient and reliable financial resources to be able to exert their *Regulatory Capacity* in the case of CBAM, as the scenario of non-adaptation by third state manufacturers could lead to potential supply risks that must be compensated for. EU importers would have to pay more than pre-CBAM for the same good/amount as prices for imports are levelled out with EU-prices. This would affect the implementation of CBAM in that sense, as substantial financial resources provide stability, resilience and eventually the long-term effectiveness of CBAM. In 2021 the combined value of all imported CBAM goods by the EU was about USD 110

billion (see table 5) while the total value of all imported goods was USD 2.5 trillion (World Integrated Trade Solution 2021). This comparatively small share is also reflected in the coverage of CBAM that too is small in relation to the total emissions related to all EU imports (see table 5, see Beaufils et al. 2022, p. 2). Adding all direct emissions of the six CBAM sectors - iron and steel, fertiliser, hydrogen, electricity, cement, aluminium - equals 83 megatonnes of CO2 (Beaufils et al. 2022, p. 2). Including all EU ETS sectors to CBAM would lead to an increase to 179 megatonnes of CO2 covered (ibid.), while a comprehensive CBAM would cover 1,558 megatonnes (ibid., p. 3).

The following data shows the main sources of external EU imports in relation to the CBAM-goods which gives indications on the EU's *Regulatory Capacity* and an overview of the financial and economic dimensions CBAM goods carry for the EU.
Of all external imports into the EU, the share of imported iron and steel makes up for 2.29% which equals USD 57.7 billion (OEC 2021) and thus represent the biggest share of all imported CBAM-goods. The second largest import share of all CBAM-goods with 1.35% and a value of USD 33.9 billion is related to aluminium (OEC 2021). Of all CBAM-goods cement makes for the smallest import share with 0.026% and a value of USD 651 million (OEC 2021). Electricity comes in third place in terms of import share with 0.34% and USD 8.63 billion in value (OEC 2021). Fertiliser makes for an import share of 0.031% and a value of USD 7.7 billion (OEC 2021). The EU imports comparatively little Hydrogen with a total share of 0.067% and a value of USD 1.68 billion (OEC 2021).

	Iron & Steel	Aluminium	Cement	Electricity	Fertiliser	Hydrogen
Overall share and value	2.29% total import share $57.7B	1.35% total import share $33.9B	0.026% total import share $651M	0.34% total import share $8.63B	0.31% total import share $7.7B	0.067% total import share $1.68B
1.	15.6% Russia	14.1% Norway	38.8% Türkiye	86.6% Türkiye	37.7% Russia	26% Norway
2.	10.7% Türkiye	13.3% China	9.1% Algeria	36.3% Switzerland	10.5% Egypt	13% US
3.	9.5% India	9% Türkiye	7.5% UK	21.8% Norway	9.9% Morocco	10.4% China
4.	9% Ukraine	7.9% Iceland	7.3% Ukraine	13.4% Morocco	6.5% Belarus	7.9% Algeria
5.	7.1% UK	7.3% Russia	5.9% Belarus	10.9% Russia	5.1% Algeria	6.4% Kazakhstan
	5.3% China 1.5% US	1.64% US	1.6% China 0.22% US	0% China & US	0.85% US 0.72% China	

Table 5 (Author's own depiction: Latest available data from OEC 2021 - EU profile)

Established in 1993 the European Single Market is one of the core elements of the European project. With a combined GDP of EUR 14.5 billion in 2021, it is the second largest economic area (after the US and China) and provides 56 million jobs related to internal trade (Council of the European Union 2024 a). Bradford highlights the importance of resilience for strong *Regulatory Capacity* or 'the quality of being able to return quickly to a previous good condition after problems' (Cambridge Dictionary 2024). One example for this is the recent 'Single Market Programme' of the European Commission. As a result of recent crises, such as the Covid-19 pandemic or Russia's war of aggression against Ukraine, the European Union actively works on strengthening its so-called strategic autonomy (Council of the European Union 2024 a). The aim is 'the reduction of external dependencies in strategic areas [...] while preserving an open economy' (ibid.). Providing funding of USD 4.2 billion from 2021 to 2027, the 'Single Market Programme' pools several activities that have previously been individual initiatives (ibid.). A special issue of the Journal of European Integration finds that there are several policy areas with a single market integration outcome that

indicate resilience such as banking and energy, investment, transport, network industries, defence and higher education (Raudla and Spendzharova 2022). Sectors like energy, investment or network industries are especially relevant in relation to the CBAM which will be discussed in the following chapter.

For the CBAM, Preamble 26 sets out details about enforcement and potential penalties in cases of non-compliance (European Parliament and Council 2023). For each CBAM emission certificate that is not surrendered on time a payment of penalty is due in accordance with ETS regulations (ibid.). Member States may decide on the exact penalty design (ibid.). Moreover, reporting obligations shall be simplified, accessible and decoupled from the ETS compliance cycle to avoid twofold burden (ibid.). Further, Preamble 13 section 2 provides the right to share information across EU institutions and national law enforcement authorities to ensure compliance and enforcement (ibid.). Article 30 specifies the Commission's reviewing obligations that include a detailed report to the Parliament and Council with information about practices of circumvention and the imposition of penalties as well as investigations about their effect (ibid.). Additionally, Preamble 80 states:

> 'The financial interests of the Union should be protected through proportionate measures throughout the expenditure cycle, including the prevention, detection and investigation of irregularities, the recovery of funds lost, wrongly paid or incorrectly used and, where appropriate, administrative and financial penalties. The CBAM should therefore rely on appropriate and effective mechanisms for avoiding losses of revenues.'

There is only a weak liable legal basis for imposing strict sanctions against a country for merely crimes against the environment (Academy of European Law 2024). Neither have there been sanctions imposed (see Giumelli and Hoffmann and Ksiazczakova 2021), nor are any of the sanctions currently in place based on this (European Commission 2024 b).

In the last decade, the Commission increasingly abstained from taking measures to implement and enforce their policies which is also illustrated by a decline in infringement procedures brought to the Court of Justice of the European Union (Lenschow 2021, p. 314). However, of those cases worked on at the Court, 30 percent

are related to environmental policies in 2019 (ibid.). In 2022, out of 551 infringement procedures 104 are related to environmental policies and 4 to climate action which gives it a quota of about 20% (European Commission 2022). For taxation and customs there are 50 new cases that came up in 2022, including non-communication or wrong application of policies as causes of infringement (ibid.). In January 2024, the Commission took infringement measures against all EU member states, except Denmark, due to a lack of compliance with a new directive strengthening the Emission Trading System and not implementing it into national law timely (European Commission 2024 f).

The so-called ‘EU Pilot’ is a pre-infringement measure that can be taken before or instead of a formal infringement procedure (European Commission 2022). Between 2018 to 2022 the number of EU Pilot cases more than doubled from 110 cases to 279 cases (ibid.). While in 2018 21 cases were related to environment, customs and taxation counted for 10 cases (ibid.). In 2022, however, only 2 EU Pilot cases dealt with environmental issues, yet 66 cases were connected to taxation and customs (ibid.).

In order to strengthen the EU regulatory expertise, the EU relies on the support and input of informal expert groups. Since July 2022, the ‘Informal Expert Group on analytical Methods for the Monitoring, Reporting, Quantification and Verification of embedded Emissions in Goods under the Scope of CBAM’ assists the Directorate General Taxation and Customs Union in the policy-making process of the CBAM regulation specifically concerning topics of methodology for the actual implementation of the policy (European Commission 2024 c). It consists of 38 full members and 22 observers, ranging from organisations like non-governmental organisations or trade and business associations to Member State authorities or missions to the EU of third states (ibid.). Full membership is held by nine trade and business associations covering the sectors of cement (twice), electricity, metals in general, aluminium, chemicals in general, steel (twice) and fertilisers, thus generally all of the goods covered by the CBAM (ibid.). However, the call for applications does not mention hydrogen once (ibid.), as it was only included into the CBAM at a later point in time (ibid.). All of the respective associations were invited in the call for applications to apply for membership or at least become observers in this expert group (ibid.). So far, the group has held six meetings covering details of the different methodologies for

calculating the embedded emissions of each individual good (ibid.). Throughout the meetings the EU's Joint Research Center plays an essential role in providing the scientific basis on the matter and members only providing additional advice and expertise (ibid.).

There was a second call for applications in late autumn 2023 for a general 'Informal expert group on the Carbon Border Adjustment Mechanism' to support the Commission in the development of implementing measures, delegated acts and policy initiatives related to the CBAM (European Commission 2024 d). Thus, their work builds up on the outcomes of the previous expert group, while focusing on the actual legal implementation rather than the policy design (ibid.). As with the first group of experts, this one will work directly for and with the Directorate-General for Taxation and Customs Union (ibid.).

The main responsibility in carrying out CBAM and the related bureaucratic tasks are not with the Commission itself but rather with the so-called 'National Competent Authority' of each Member State (European Parliament and Council 2023). These 'National Competent Authorities' are not chosen by the Commission but selected by the Member States themselves (ibid.). They are mainly federal offices, agencies or ministerial departments designated for CBAM or ETS purposes (European Commission 2024 e). For instance, the Austrian Office for the National Emissions Trading System, the German Emissions Trading Authority, the Italian Ministry of Environment and Energy Security or the Irish Environmental Protection Agency (ibid.). Article 12 of the CBAM regulation lays out the Commission's tasks and responsibilities towards the 'National Competent Authorities': '[...] the Commission shall assist the competent authorities in carrying out their functions and duties under this Regulation and shall coordinate their activities by supporting the exchange of, and issuing guidelines on, best practices within the scope of this Regulation, and by promoting and adequate exchange of information and cooperation [...]' (European Parliament and Council 2023). It is not specified in the policy document whether Member States or 'National Competent Authorities' receive any financial measures by the Commission to increase or support *Regulatory Capacity* building (ibid.).

Coherence in climate and environmental policy-making is a relevant aspect for

Regulatory Capacity and eventually for the Brussels Effect of CBAM to ensure that policies are not mutually negatively affecting one another, undermining their effectiveness. There are several attempts to streamline and achieve coherence in environmental policy making by the EU. Coherence across carbon pricing approaches especially within the EU ensures effective results while a lack of such 'inevitably distorts companies' and consumers' behaviour and undermines the rationale for carbon pricing' which makes it even more relevant (Barnes 2021, p. 19). Framework regulations like the EU's '8th Environment Action Programme', the Green Deal and the Fit for 55 initiative or geopolitical blueprints such as the 'Sustainable Development Goals' by the United Nations are tools to streamline policy-making and avoid mutually impairing policy-outcomes. There are two EU Member States - Germany and Austria - that operate their own emissions trading systems (Organisation for Economic Cooperation and Development 2023, p. 41). While the Austrian ETS works complementary to its EU relative by covering transport and buildings, the German system covers transport, buildings but also industry and electricity like the EU ETS (International Carbon Action Partnership 2024). There is no information about national carbon border adjustment policies by EU Member States.

The EU has an overall strong *Regulatory Capacity* for climate and environmental policies and CBAM is not an exception for this. The potential financial resources necessary to balance import disruptions of CBAM goods are bearable, policy-development was supported by (scientific) expert input and CBAM is coherent with EU and similar national policies. However, enforcement and sanctioning mechanisms for (non-)compliance are weakly established. Thus, in relation to the prediction of 'the stronger the EU's *Regulatory Capacity* to implement CBAM, the more likely externalisation is to occur' shows to have a complex picture. How this *Regulatory Capacity* in relation to CBAM can be expressed in *Stringent Standards* and eventually be translated into unilateral global regulatory influence, will be examined in the following chapter.

c. Stringent Standards

The following section analyses how stringent the EU's standards are when it comes to the Carbon Border Adjustment Mechanism and those policy fields it is embedded in. To develop a clear and broad perspective on the EU's propensity to develop, enforce and promote *Stringent Standards*, this chapter follows the following structure. The first section uses a comparative international perspective, analysing other CBAMs and carbon pricing schemes to establish an understanding for the EU's standards through an external comparison. After this, indicators for *Stringent Standards* are evaluated such as level of income and political will.

Strong government credibility is another decisive factor for carbon pricing effectiveness in the EU, with the counterpart to this being market forces on the other side of the spectrum (Barnes 2021, p. 23). The more certain and stable government decisions and policies are, the more likely companies will take long-term actions and investments relating to carbon reduction and decarbonisation (ibid.). Another challenge for government credibility are the time horizons for climate action and emission reduction targets which go well beyond legislative terms and even lifetimes of current politicians (ibid.).

The fact that CBAM has the legal form of a regulation and not a directive suggests it to be comparatively stringent. As a regulation it is directly applicable law that does not require long-transitional phases for developing national legislation and thus binds significant member state resources as the commission takes on the majority of the administrative duties. Additionally, a regulation represents a higher level of Europeanisation and centralisation due to its coherence across the whole of the European Union and the European institutions being the central actors in developing and implementing it. Even though CBAM is directly applicable law it includes a transitional phase from October 2023 to 2026 where only reporting responsibilities and no financial obligations apply (European Union 2024). For this purpose the Commission's Directorate General for Taxation and Customs Union provides a so-called 'CBAM Transitional Registry' online tool for importers that provides guidance as well as a channel to directly submit required reports (European Commission 2024 g). In August 2023, an implementing regulation entered into force to guide and ensure a

uniform application of those reporting obligations of the core CBAM regulation (European Commission 2023). Despite this centralisation, Member States play a central role as they provide access to the 'CBAM Transitional Registry' through their respective 'National Competent Authority' (European Parliament and Council 2023). 'National Competent Authorities are authorised and encouraged to 'exchange any information that is essential or relevant to the exercise of their functions and duties' (Article 11) (ibid). The price of CBAM certificates will be calculated 'as the average of the closing prices of EU ETS allowances on the auction platform' (Article 21.1) (ibid.). They must be surrendered annually by the companies and branches targeted with CBAM (Article 22.1) (ibid.) and once this process has run through, remaining allowances are cancelled by the Commission without compensation (Article 24) (ibid.) and a new cycle of allowance auction starts. Thus, it is not only crucial for the ETS allowances to have a price that is high enough to set economic incentives for reducing emissions but also for the stringency and efficacy of CBAM.

The EU's preference for *Stringent Standards* is also reflected in the implementation mechanisms of CBAM. There are a number of exemptions to the regular procedure as explained in chapter three section c.
If there is already a carbon pricing scheme applied to the respective CBAM-good in its country of origin, EU-importers do not have to buy additional CBAM certificates, to avoid a double price (European Parliament and Council 2023). Further, as long as the product value does not exceed EUR 150, small importers or natural persons are not affected by CBAM obligations (ibid.). During the transitional phase of CBAM from October 2023 to December 2025, quarterly reportings are required, yet there is the option to delay the submission by 30 days (for each reporting period) (ibid.). The European Commission reviews these reports and informs the respective NCAs about flawed reports, that can then penaltise the importer with EUR 10 to EUR 50 per tonne of unreported emissions (ibid.), yet the current ETS price is about EUR 69 (ibid.).

As explained already, the price for CBAM certificates will be the same as for ETS allowances which was the maximum price policy-makers could aim for while at the same time being WTO-compliant. One of the most relevant factors for the effectiveness of CBAM, is the phase-out of the free allocation of ETS allowances in

general but in particular for sectors included under CBAM. This is crucial to set a market-based incentive for industries to reduce greenhouse gas emissions (ibid.). While for sectors that are less exposed to carbon leakage, the share of free allowances will be reduced to 30% until 2026 and phased out thereafter by 2030 (ibid.). However, so far there is no regulation on how this procedure will phase-out exactly for highly exposed sectors once CBAM is fully implemented from January 2026 on. 'Installations in sectors exposed to a significant risk of carbon leakage in principle are eligible to receive free allocation at 100%' (ibid.). Having CBAM and free allowances run simultaneously, would significantly weaken the price signal that the system provides and negatively affect incentives for investment into reducing emissions or even make CBAM completely obsolete (ibid.).

Moving on to the next contributing factor for *Stringent Standards* - political will. The following section elaborates on the stances of EU Parliament's four biggest political groups as major actors in the policy-making process towards CBAM to assess their preference for a stringent policy design.

The S&D group claims it 'has been at the forefront of the negotiations on this mechanism' and has 'been leading the efforts to make this mechanism more ambitious and fit for purpose' (S&D 2023). In 2017 the S&D group suggested a carbon adjustment tax to diversify the funding sources of the EU budget (S&D 2017) which was brought about again a year later (S&D 2018). In 2019, Paolo Gentiloni of the S&D group was selected to join Ursula von der Leyen's cabinet as Commissioner for Economy (S&D 2019) with one of his priorities being the development of a 'carbon border tax' (ibid.). Among other things, the S&D group suggested in summer 2020 to establish CBAM and use its revenues for the post COVID-19 pandemic recovery (S&D 2020). Further, they expressed their willingness to support Commissioner for Trade, Valdis Dombrovskis in 'the introduction of a WTO-compliant Carbon Border Adjustment Mechanism' (S&D 2020 a). A press release from May 2022 points out the need to defend the EU Parliament's ambitious position to defend in the interinstitutional negotiations with the Council (S&D 2022).

Renew Europe positions itself as 'a driving force in the European Parliament for raised climate ambition' (Renew Europe 2022). The Renew Europe Group 'also strongly

supports the swift implementation of a robust [...] carbon border adjustment mechanism' (Renew Europe 2022). Like the S&D group, they promote the idea of CBAM revenues being used as so-called own resources to diversify the EU budget (Renew Europe 2022 a) and are committed to 'strengthen and expand it [CBAM] in the coming years (Renew Europe 2022 b).

The first call for a carbon border adjustment from the Green/European Free Alliance (EFA) group dates back to 2010, stressing the need to align European trade and climate policies (The Greens/EFA 2010). Ever since the Greens/EFA have campaigned and strongly supported a Carbon Border Adjustment Mechanism. In a position paper on an update of the ETS from May 2021 the Green/EFA group expressed their support for the introduction of CBAM to 'protect domestic industry' and leverage climate action abroad (The Greens/EFA 2021). After the publication of the Sixth Assessment Report by the IPCC, the EP's Green/EFA group sent a letter to the Commission in September 2021 urging it to realise 'a rapid fade out of free allowances in the ETS' (The Greens/EFA 2021 a). Highlighting the risk of being incompatible with WTO rules, as the practice of free allocation and CBAM 'could be perceived as a double subsidy' (ibid.). Yet, they suggest 'a short transition period' (ibid.) for trading partners to adjust to CBAM regulations (ibid). In a press release from December 2022, they welcomed the agreement by the Parliament, Commission and Council on CBAM calling it out to set 'new standards for European and global industrial production' and to generate a global motion towards climate-neutral production processes (The Greens/EFA 2022). The Greens/EFA regularly point out the importance of a just transition towards net-zero and suggest to financially support or use CBAM revenues for 'poorer countries, which do not bear historic responsibility for climate change' (The Greens/EFA 2023).

The biggest parliamentary group with 175 members from all EU Member States, the EPP, also supports the implementation of a carbon border adjustment policy (EPP 2023). Yet, they rather highlight the economic benefits for European industries and labour markets instead of pointing out environmental advantages (EPP 2021; EPP 2021 a). The EPP advocats the use of CBAM revenues for the EU budget to run down the debts resulting from the Covid-19 recovery package and force Member States to invest in climate protection measures (EPP 2023).

Despite these positions, the European Parliament was deeply divided on the actual deadline for phasing out free allowance allocation (Simon 2022). The EPP supported a 2034 deadline, Renew Europe and S&D were in favour of a 2032 deadline and the Parliament's environmental committee suggested a 2030 deadline (ibid.). Yet eventually Parliament reached an agreement, with the compromise leaving the biggest groups EPP, S&D, Renew Europe and Greens/EFA satisfied (Simon 2022 a). With 487 in favour, 81 against and 75 abstentions, Parliament adopted their resolution on the Commission's proposal (European Parliament 2023 a). The establishment of a Carbon Border Adjustment Mechanism was a legislative priority from 2021 for Parliament, Council and Commission (European Parliament 2024). Parliament aimed for a more ambitious CBAM legislation than the Commission proposal suggested in order to have a strong position in inter-institutional trilogue negotiations (Weise and Cokelaere 2022). It took about two years from the initial proposal for CBAM being published by the Commission in July 2021 until the final act being published in the Official Journal in May 2023 (European Parliament 2024).

The Competitiveness Council was also involved with CBAM (Council of the European Union 2021), yet the Economic and Finance Council worked more intensively and often on the matter with a working group (Council of the European Union 2021 a) and over the course of five meetings (see Council of the European Union 2024 b). During their final session on CBAM on the 15th of March 2022, the Economic and Finance Council, almost all Member States were in favour of the CBAM proposal (Council of the European Union 2022 a). The Presidency of the Council which was held by France at that time was leading the development and subsequent amendments to the general approach of the Council for trilogue negotiations (ibid.).

Germany generally supports CBAM and advocates for the phase out of free allowances to ensure the efficiency of CBAM and general climate efforts (ibid.). Additionally, Germany suggests embedding CBAM into the concept of a so-called 'Climate Club' (ibid.). The Scandinavian countries of Sweden, Finland and Denmark also support the Council's general approach for CBAM, both support the idea of a 'Climate Club' and highlight that there is no alternative to CBAM on the table and it therefore being the only option to accelerate the decarbonisation of industries (ibid.).

Further Denmark stresses the importance of a green transition, especially in light of energy independence and the Ukrainian war (ibid.).

The southern Member States of Italy, Spain, Portugal and Greece too strongly support CBAM, its external effects and the French Presidency's proposal (ibid.). Yet, Greece mentions the impact assessment of CBAM on export volumes as an important issue as well as potential overlaps between CBAM and the ETS (ibid.). Malta also accepts the general approach and welcomes the more centralised policy design over the previously decentralised CBAM implementation (ibid). Further support for CBAM and the Council's general approach comes from the Benelux countries Belgium, Netherlands and Luxembourg, all of which expressed their commitment and wish for an agreement (ibid.). The remaining speakers for the Czech Republic, Croatia, Lithuania, Slovenia, Ireland and Slovakia all support the general approach for trilogue negotiations (ibid.). However, Hungary does not object to the general approach in the spirit of compromise but just like Romania sees additional need for discussion and revision of the approach (ibid.). Poland is the only of the speaking countries that does not support the text as they see energy and geopolitical security at stakes referring to the Ukrainian war that challenges the green transition (ibid.). Establishing CBAM and delivering on the Green Deal was one of the working priorities of the French Presidency (French Presidency of the Council of the European Union 2022). It is also part of the 18-month trio-programme of the Council for the French, Czech and Swedish Presidency and thus is deeply rooted in the work of the Council for January 2022 to June 2023 (ibid.).

Following the prediction of 'the stronger the EU's preference for an ambitious CBAM regulation is, the more likely externalisation is to occur' the analytical finding in relation to *Stringent Standards* suggest that the policy design and implementation mechanism show a preference for stringency as well as the majority of the European Parliament and the Council. Nonetheless, the pivotal aspect of the phase-out of free allowances under the ETS has yet to be clearly regulated. Another challenge to implementing *Stringent Standards* and the CBAM is the risk of trade conflicts as it might be perceived as a form of protectionism (Böhringer et al. 2022, p. 23). This will be analysed in more detail in the following chapter of this paper.

d. Inelastic Targets

This chapter analyses the elasticity of the targeted goods under the CBAM and how strongly they are tied to the EU's regulatory regime. To gain an understanding of the issue, the responsiveness of the CBAM-goods to regulatory change is evaluated by examining the policy design of the regulation and comparing the elasticity of the respective goods before and after the mechanism entered into force, as well as analysing legal challenges to regulating goods or rather their production to become *Inelastic Targets*.

All of the CBAM-goods - Iron & Steel, Aluminium, Cement, Electricity, Fertiliser and Hydrogen - are *Inelastic Targets* and strongly bound to the EU's regulatory regime. As per definition CBAM's goal is to make these goods as inelastic as possible. The manufacturer's location is irrelevant and moving to a different country will not allow them to circumvent the CBAM regulation without losing access to the EU single market.

Preamble 10 of the regulation points out that 'CBAM is expected to also contribute to promoting decarbonisation in third countries' and Preamble 14 states that '[...] this Regulation would also encourage producers from third countries to use technologies that are more efficient in reducing greenhouse gases so that fewer emissions are generated' (European Parliament and Council 2023). This regulation applies to all CBAM goods that are imported into the EU market from third countries (Preamble 16) (ibid.). The only exceptions from this are when their production is already covered by the EU ETS or a carbon pricing system that is fully linked to the EU ETS (ibid.).

Before this regulation entered into force, CBAM goods were only moderately bound to the EU's regulatory regime. Being covered by the EU ETS, electricity, steel and iron, aluminium, cement, hydrogen and fertilisers are subject to a carbon pricing scheme (European Parliament and Council 2003). Yet, they were still elastic to some extent, as production can easily be shifted to outside the EU to avoid regulation and expenses (European Parliament 2023 b). This effect of carbon leakage is rather typical as it usually follows two channels: Emission regulations in certain economies such as the EU reduces the demand for fossil fuel which then leads to price drops and eventually to

increasing demand in unregulated regions and economies (Böhringer et al. 2022, p. 22). The other channel being that unilaterally regulated carbon-intensive businesses (within the EU) reduce production while production of unregulated businesses abroad (in third states) increases (ibid.).

The Carbon Border Adjustment Mechanism taxes emission consumption rather than production emissions and improves not only the cost-effectiveness of unilateral action by the EU but also reduces carbon leakage (ibid., p. 22). The carbon-intensity in production is higher in non-OECD countries than in OECD countries (ibid., p. 25). Border carbon adjustments are mostly rather effective in reducing carbon leakage through the competitiveness channel by about one-third (ibid., p. 26). This mechanism 'levels the playing field' and secures competitiveness among industries (ibid.). Essential element and outcome of this is tying the CBAM goods to the regulatory regime of the EU by preventing avoidance strategies to existing EU regulations.

The EU's approach to restrain this from occurring used to be the free allocation of emission certificates to the respective industries (European Parliament and Council 2023). On the one hand, this would keep the cost for manufactures and the risk of carbon leakage low, on the other hand incentives to reduce emissions were also low (ibid.). The CBAM regulation aims at addressing and closing this policy gap. It marks the transition from the CBAM goods being moderately elastic to being inelastic and strongly tied to the EU's regulatory regime.

However, there are legal constraints to the Carbon Border Adjustment Mechanism and thus making the targeted goods inelastic, since it has to be compliant with international trade laws of the World Trade Organization (WTO) (Böhringer et al. 2022, p. 23). Against this background, European institutions were rather aware of this and thus the initial resolution of the European Parliament in March 2021 called for 'a WTO-compatible EU carbon border adjustment mechanism' (European Parliament 2021). The following proposal by the Commission again emphasised the importance of consistency with existing rules and regulations in this policy area also in relation to the WTO (European Commission 2021 a). Six different CBAM policy options were proposed all of which 'take account of WTO requirements and of the EU's international commitments' (ibid.). The WTO welcomed the Union's approach but highlighted that

‘unjustifiable discrimination or disguised protection’ would be a violation to existing international law (WTO 2021). The ‘World Trade Report 2023’ states that ‘some WTO members have raised concerns about the proposed CBAM, citing potential discriminatory impacts on their exports. They [WTO members] argue that it may also lead to the adoption of European standards by other economies and impose significant compliance costs on exporters’ (WTO 2023, p. 98).

However, EU legislators decided against a whole array of non-tariff barriers to trade when opting for CBAM and its regulatory mechanism. They did not choose to prevent carbon leakage through, for example, import quotas, subventions for local industries, trading blocs/embargos or currency manipulation (Institute for Government 2017). Instead, they selected a policy based on technical barriers/ requirements to trade including not only the (CO2-) content of a product but inevitably their manufacturing process.

In particular, there are four options the Commission discarded at an early stage during their policy impact assessment since ‘they violated the EU’s international obligations or because they would be very complex in application’ (European Commission 2021 b). A customs duty would have required extensive revision of free trade agreements and WTO-related obligations while also making it difficult to ensure equal costs for domestic and imported goods (ibid.). Establishing a holistic EU ETS that covers all products imported in the EU would have been very challenging to practically implement due to a lack of available information (ibid.). Additionally, considering the basic mechanism of the ETS being a cap and trade system, would have required a cap on all imports which would ‘create unacceptable restrictions to global trade’ (ibid.). A carbon added tax faces a similar problem, since it would have included products further down the value chain, a vast amount of information that is not available would have been necessary (ibid.). Lastly, combining an import tax or import certificates with a refund for exports would have contradicted with the central objective of reducing greenhouse gas emissions as well as with certain WTO obligations (ibid.).

Pre-CBAM the targeted goods used to be elastic as production could be moved to third-states to circumvent EU regulations such as the ETS. However, as per definition all of the CBAM goods became *Inelastic Targets* that are strongly tied to the EU’s

regulatory regime and moving production became ineffective in circumventing climate regulations and CBAM. These findings are in close connection to the prediction of ‘the stronger the targeted goods under CBAM are tied to EU regulations, the more likely externalisation is to occur’. Whether or not this inelasticity of the targeted CBAM goods leads to a standardisation and harmonisation of the production processes according to EU regulations will be analysed in the following chapter.

e. Non-Divisibility

This last empirical chapter analyses the fifth necessary condition of *Non-Divisibility* in relation to the Carbon Border Adjustment Mechanism. The aim is to identify if the CBAM goods are affected by this condition and if they are to analyse to what extent this is the case. In order to do this, this chapter examines three dimensions of Non-Divisibility - legal, technical, economic - and has the following structure. First, the impact assessment report (2021) by the European Commission is analysed to identify early considerations on the matter. Second, the official CBAM regulation text is examined to see if and how *Non-Divisibility* is dealt with there. Third, technical aspects of *Non-Divisibility* for CBAM are discussed. Fourth, feedback from the 'Have your say'-platform by the European Commission is analysed to develop an understanding of central (third state) stakeholder opinions on the CBAM regulation and economic considerations of *Non-Divisibility*.

The 2021 impact assessment report on CBAM already considered the possibility of circumvention and divisibility through 'resource shuffling in the form of allocating low carbon production only to the EU' (European Commission 2021 b).

The official legal document of the CBAM regulation states in preamble 66 of the text how to manage cases of divisibility where production processes are individualised to fulfil EU standards but other markets are still provided with conventionally produced goods.

> 'Practices of circumvention of this Regulation should be monitored and addressed by the Commission, including where operators could slightly modify their goods without altering their essential characteristics, or artificially split shipments, in order to avoid the obligations under this Regulation. [...] or where operators in third countries would export their less greenhouse gas emissions intensive products to the Union and keep their more greenhouse gas emissions intensive products for other markets, or reorganisation by exporters or producers of their patterns and channels of sale and production, or any other kinds of dual production and dual sale practices, with the aim of avoiding the obligations under this Regulation, should also be monitored' (European Parliament and Council 2023).

Since this is only stated as a preamble and thus is not part of the actual legislation, it leaves the possibility of divisibility. Yet, it shows that legislators are aware of the risk of divisibility and other methods to circumvent CBAM.

The technical dimension of *Non-Divisibility* has two layers, one being the availability of alternative technologies for a reduced emissions output and second the possibility of dividing production processes and having new and conventional technologies in operation simultaneously.

There are quite a few technologies available to reduce CO2-emissions and thus adhere to the standards required by CBAM for all of the respective goods. For iron and steel there is the possibility for the direct reduction of iron ore using hydrogen (H-DRI) or electricity or using new more efficient smelting reactors to save energy and emissions (Somers 2022, p. 22). During aluminium production the use of hydrogen for thermal energy generation, mechanical vapour recompression, engineering improvements like waste heat recovery are just some of the options (World Economic Forum 2021, p. 20). For cement the use of oxy-fuel or membrane technologies are considered to be an alternative to conventional production processes (Holcim 2024). According to the International Renewable Energy Agency, relying on wind or solar power, hydroelectric power generation, geothermal energy or using bioenergy and biofuels for electricity production reduces emissions (International Renewable Energy Agency 2024 a). When it comes to hydrogen, installing compressed or liquefied storage solutions, leakage detection systems or applying new forms of electrolysis would reduce the impact of greenhouse gas emissions during and after hydrogen production (International Renewable Energy Agency 2024 b). Low-carbon fertiliser production mainly depends on the use of renewable energy sources as well as integrating hydrogen in certain steps of the production process (see Kayalioglu 2022).

Carbon capture and storage (CCS) and Carbon capture and utilisation (CCU), technologies as well as energy storage solutions could be potentially applied in all sectors as enabling technologies to lower carbon emissions (see Somers 2022, World Economic Forum 2021, Holcim 2024, International Renewable Energy Agency 2024 a and b, Kayalioglu 2022). However, the implementation and use of these technologies still has room for potential also in the EU (Fridahl et. al 2023). The sum of these

available technologies to reduce greenhouse gas emissions in CBAM industries illustrates the technical feasibility of adapting and changing production processes according to EU standards and CBAM requirements. Thus, considering the research question, the ultimate goal is to have as many corporations in third states as possible adapt to and use these technologies. In a panel study on the relationship between carbon pricing and climate innovation across 38 OECD countries over 34 years, Lim and Prakash came to the conclusion that the 'adoption of carbon pricing policies is associated with an increase in patent applications for climate mitigation technologies' (Lim and Prakash 2023, p. 1) illustrating the potential this technical domain carries.

Moving on to the second aspect of technical *Non-Divisibility,* the possibility of dividing production processes and having new and conventional technologies in operation simultaneously. Due to the scope of this thesis and the technical expertise required to analyse this factor, there are only two main considerations shared here.

One being that the immense size of the production facilities of CBAM goods and the significant investments necessary to change existing procedures and implement new technologies make it unlikely that production will be individualised. In other words, all of the sectors covered by CBAM show large economies of scale and the respective goods are typically mass products (IONOS 2019). Second, it is these investments and additional costs for research and development for even better technology that makes economic *Non-Divisibility* likely. Especially 'middle- and low-income countries for which the EU is an important export market would be disproportionately impacted' (Beaufils et al. 2022, p.1). These financial factors were also subject of concern in the first feedback period of the European Commission related to the CBAM regulation.

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Aspects of reputation concerns of corporations and civil society pressure could not be considered due to a lack of data availability. Analysing a company's considerations on their reputation (and subsequent compliance with *Non-Divisibility*) would require insight views of employees and an expanded research approach. For the domain of civil society, there is information available on their general stances towards CBAM. Yet, analysing the connection between civil society action and public pressure they generate on the one side and the influence this has on corporations opting for *Non-*

Divisibility on the other side is a matter that would too require an expanded research approach.

This chapter analysed the necessary condition of *Non-Divisibility* along its three dimensions of legal, technical and economic factors. Each of them revealed its distinct characteristics and manifestation in relation to CBAM. The policy design includes legal measures to prevent practises of circumvention (including dividing production processes), production of CBAM goods includes technical aspects relevant for divisibility considerations as well as economic challenges. The implications for the underlying prediction of: the more the goods under the CBAM are prone to standardization, the more likely externalization is to occur, are discussed in the subsequent chapter.

Putting these findings in relation with the prediction ‘the more prone the production processes of CBAM goods are to standardisation, the more likely externalisation is to occur’ the following points stand out. Legal divisibility is theoretically possible because it is only mentioned as a Preamble and not in a legally binding Article in the regulation. Technical and economic *Non-Divisibility* seem likely due to the number of available technologies (to reduce emissions) as well as the economies of scale.

7. Predictions & Discussion

The findings of the preceding analysis, on the five necessary conditions that need to be fulfilled for the Brussels Effect and effects of externalisation to apply, are discussed in this chapter. Additionally, implications for the predictions that can be drawn are explained and discussed.

Market Size

Given the prediction of 'the larger the EU's Market Size for the respective goods under CBAM, the more likely externalisation is to occur' the following stand out. Analysing the import share of the top-5-exporting countries as well as the US, China, the UK, Türkiye and Switzerland if not among them reveals some information about the EU's *Market Size* in relation to the goods covered by CBAM.

When looking at the import share of the respective countries into Europe several aspects stand out. For the UK, Switzerland and Türkiye, Europe is the number one export destination not only for iron and steel but also for aluminium. When it comes to cement, Europe again is the biggest export destination for the UK. Europe also is the largest export market for the UK, Switzerland, Türkiye and Norway for electricity and hydrogen exports. Looking at the last CBAM good, fertiliser, the UK and Türkiye send most of their exports to Europe.

It clearly shows that Europe is an especially relevant export destination for the UK, Switzerland, Türkiye and Norway considering CBAM goods. For China and the US which are traditionally close trading partners for Europe and the EU, none of the CBAM goods are mainly exported there.

The second step of analysing the EU's Market Size included the share of total export volume of these exporting countries to understand the economic relevance of the sector. Iron and steel exports make up for 6 percent and aluminium 2.6 percent of the total export volume for Türkiye which is a comparatively high share. However, for China, the US, the UK, Switzerland and Norway the export of CBAM goods make up only for a very small share of the total export volume. This in contrast to the earlier findings of the UK, Switzerland and Norway having Europe as their number one export

destination for CBAM goods. Yet, this is not necessarily a contradiction since both countries export final products further down the value chain.
Lastly, the projected demand gives indications of the EU's future *Market Size* in relation to the CBAM goods. Estimations show a rising demand for all of the goods while aluminium is considered to be especially relevant in the future.

Regulatory Capacity
Having predicted that 'the stronger the EU's Regulatory Capacity to implement CBAM, the more likely externalisation is to occur' the subsequent aspects are prominent. The EU's *Regulatory Capacity* in relation to the Carbon Border Adjustment Mechanism shows some strengths and future challenges. Looking at the financial resources that are necessary to implement CBAM, the external import share of these goods show that iron and steel together with aluminium make for the biggest share. While iron and steel imports account for 2.29 % of all imports (2022) and a value of USD 57.7 billion it is 1.35 % and USD 33.9 billion for aluminium. Further the EU makes efforts to strengthen their resilience and sanctioning authority to increase their *Regulatory Capacity* for instance through the Single Market Programme. Yet, the CBAM policy design only provides a weak sanctioning authority as such mechanisms are only vaguely mentioned in a Preamble. To enhance their regulatory expertise, the European Commission relied on the support from a CBAM expert group as well as from the Joint Research Centre to advise the policy-making process with their expertise and research. This choice allowed for stakeholder opinions and scientific input to be considered for policy design options.

Since the 'National Competent Authorities' are already established and specialised entities it is likely that they are vested with regulatory expertise. Yet, the role of the Commission in supporting and providing further capacity building options or resources remains rather superficial. Another aspect to *Regulatory Capacity* is the coherence in policy-making for which the EU has the Environmental Action Programme that attempts to streamline policies in this domain. CBAM is also coherent with Member States' policies as there is hardly any overlap with national emissions trading systems.

After all, there is a general decline in official infringement procedures by the Commission against Member States. However, there is an increase in pre-

infringement measures taken to enforce the implementation of policies and regulations. In 2024, there even was an infringement procedure against all Member States (except Denmark) concerning the ETS, showing a degree of dedication for actually demanding and having effective implementation measures taken.

Stringent Standards

For the prediction of 'the stronger the EU's preference for an ambitious CBAM regulation, the more likely externalisation is to occur' the following aspects are especially relevant. The dimensions of the third condition, *Stringent Standards*, reveal several layers that are relevant and play into the working prediction. The CBAM policy being a regulation and not a directive show a higher degree of Europeanisation and stringency. In addition, the policy design itself establishes a centralised registry for importers, strengthening coherence and stringency.

The biggest political groups of the European Parliament also show to have different preferences on the stringency of CBAM. The S&D group was one of the driving forces to develop CBAM and suggest using revenues for post COVID-19 pandemic recovery. The Renew Europe Group also supports CBAM but suggests using revenues to diversify the EU budget. The Greens were the first group to suggest the development of CBAM. Their idea is to use revenues to support low-income countries that are affected by CBAM regulations. The EPP supports CBAM with economic motives but also suggests using revenues for the general EU budget.

The Member States all of which are represented in the Council of the European Union also had different preferences in how stringent CBAM turned out. Adopting this regulation was one of the priorities of the French Council presidency, leaving France especially pleased about the adoption of the policy. Hungary and especially Poland were most sceptical about CBAM, yet most Member States welcome and fully support CBAM.

Inelastic Targets

The prediction of 'the stronger the targeted goods under CBAM are tied to EU regulations, the more likely externalisation is to occur' has the following implications.

With the CBAM goods being previously elastic to some extent and only loosely tied to the regulatory regime of the EU, they are now *Inelastic Targets*. Despite the initial scepticism of the WTO on this regulation, it now supports CBAM with it being compliant with WTO-regulations. There are several policy alternatives to the current design to achieve inelasticity of CBAM goods, but all of these were discarded after thorough assessment. Through the adoption of the CBAM policy, the targeted goods were inevitably and strictly tied to the EU's regulatory regime.

Non-Divisibility

Lastly, the three domains of *Non-Divisibility* carry complex and relevant information about this condition as well as for the prediction 'the more prone the production processes of CBAM goods are to standardisation, the more likely externalisation is to occur'. From a legal perspective the policy design considers and aims at preventing practices of dividing production processes and requires *Non-Divisibility*, yet it is rather nonspecific about sanctioning measures. For all of the CBAM goods there are alternative technologies available to change production away from conventional processes. Due to the size of installations, it is unlikely that companies would divide their production which is mainly reasoned by economic considerations as the scope of investment is naturally rather large. The economic and bureaucratic burden is especially high for low- and middle-income countries that are affected by CBAM.

The implications for the overall argument of: the more significant the five necessary conditions of the Brussels Effect are fulfilled, the more likely externalisation is to occur, show that not only all of the necessary conditions are met in the case of CBAM but that some of them show strong traits that clearly exceed the minimum requirements (as can be observed especially for *Regulatory Capacity* and *Inelastic Targets*) for the Brussels Effect to occur. This also carries implications for the question of the Brussels Effect appearing de facto or de jure. According to the logic of the theory and the findings of the empirical analysis, a moderate de facto Brussels Effect could be expected (yet only for some states). However, if this translates into a de jure adaptation of EU regulations remains to be seen.

8. Summary & Conclusion

This thesis aimed at analysing if the European Union's Carbon Border Adjustment Mechanism can potentially do justice to its inherent goal of effects of policy externalisation on third states. The relevance of this topic is rooted in the ambitions and advantages of understanding if this policy is actually effective and not just an empty promise on paper but achieves its ultimate goal of greenhouse gas reductions (and more ambitious climate policies) in third states. Anticipating the impact and effect of CBAM helps to develop tailored adaptations and solutions to overcome challenges or unintended side-effects. This thesis is a contribution to the under-developed field of ex-post policy evaluation research that is generally considered to be important for sustainable, lasting, effective and sensible policy design of every high-impact policy.

Summarising the main findings for each necessary condition of the Brussels Effect leads to the following conclusions. According to the *Market Size* of the EU in relation to the CBAM goods, the biggest impact is anticipated to be experienced by the UK, Switzerland, Türkiye and Norway while the US and China are less affected, probably since their trade relations to the EU are based on goods that are either not covered by CBAM or products that are further down the value and therefore not included. When it comes to the *Regulatory Capacity*, the EU has to have significant financial resources to balance out potential economic losses due to CBAM, especially for their high external import share of iron and steel as well as aluminium that have a combined worth of more than USD 90 billion. Further, the EU has to strengthen their sanctioning authority and infringement procedure scheme to enforce implementation and compliance. Yet, it shows to have a strong and deep regulatory expertise as well as coherence within their policy architecture. Here the European Parliament stayed in the tradition of being the 'greenest' of the EU institutions and the vast majority of Member States being rather supportive of CBAM. The CBAM policy design also found a solution of making the targeted goods *Inelastic Targets* and strongly tying them to the regulatory regime of the EU while at the same time being compliant with WTO-regulations. Lastly, *Non-Divisibility* is actively addressed in the official legal document, with alternative technologies to conventional processes for every CBAM good being available. It is anticipated that this condition is fulfilled since divisibility is unlikely from a technical and economic point of view.

Following this logic, carbon markets need to follow a system that steadily increases prices until the emission reduction targets are met (Barnes 2021 p. 19). Not only the level but also the scope of carbon pricing is a decisive factor since there has to be a sufficient scope of activities and greenhouse gases covered with carbon pricing (ibid.). A large scope of activities included in carbon pricing schemes ensures a higher effectiveness of such (ibid.).

Given the overarching argument of 'the more significant the five necessary conditions of the Brussels Effect are fulfilled, the more likely externalisation of CBAM is to occur' together with the research question of how and to what extent the Carbon Border Adjustment Mechanism could trigger externalisation lead for the following answer and conclusion. The Carbon Border Adjustment Mechanism of the European Union and its related climate policies can be located somewhere between window-dressing and the golden path. Even though CBAM shows great potential in minimising carbon leakage and improving the effectiveness of the EU ETS, a universal Brussels Effect triggering global effects of externalisation and unilateral regulatory authority of the EU, is unlikely since large emitters like the US and China are not significantly affected by it. Expanding the scope of CBAM by including more goods or applying it further down the value chain as well as increased prices for allowances could work as an incentive and improve the policies efficacy in terms of (long-term) global emission reduction.

As previously discussed, there are a number of research limitations to this thesis due to the chosen research design and methodology. However, these limitations carry room for potential future research opportunities. First and foremost, there is the possibility of using a different theoretical framework than the Brussel's Effect to analyse effects of policy externalisation, diffusion, transfer or learning in relation to the CBAM policy. Other than that, using a different perspective and doing field research in the most affected countries under CBAM for an external perspective of such effects. One could also do a policy comparison with similar CBAM policies of other countries or use a large-N-sample of all countries the EU has trade relations with to add a broad comparative layer to the analysis especially for the *Market Size* dimension. Future research could also examine the relevance of including other sectors and goods into CBAM or expanding the scope of it along the value chain. On a more specific note,

future research could look into how the EU can strengthen its *Regulatory Capacity* for CBAM or how to overcome other weaknesses in relation to the conditions analysed here, for instance the technical and economic dimensions of *Non-Divisibility*. A different research design could use a pure foresight-oriented approach to explore (potential) alternative scenarios and futures which might be especially interesting and valuable for the transitional period of CBAM as well as with regards to the role CBAM goods might play in the future. Additionally, foresight could give answers to the matter that any CBAM policy solely is an intermediate policy solution (when all countries use carbon pricing schemes CBAM loses its effectiveness as there is no need to put a price on imported emissions).

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