

The Climate Tragedy: A Law and Economics Analysis of Climate Change, The Paris Agreement's Compliance Mechanism and Further Enforcement Possibilities

Rafaella Moscalewsky

European Master in Law & Economics, 2022

Abstract: Climate change has been a concern in the international community for more than three decades; however, despite the promises made and international treaties signed, the world is still facing an increase in temperature and carbon emissions over the years. The externalities caused by the usage of fossil fuels nowadays are not completely internalised and the threat of a tragedy of the commons is imminent. The written obligations on international treaties are not sufficient to avoid the tragedy without effective enforcement mechanisms. This thesis is guided by two research questions: (1) Why stricter enforcement mechanisms were not adopted in the Paris Agreement? (2) What would be an effective and realistic mix of enforcement mechanisms for tackling climate change? The analysis is organised as follows: first, an introductory section about the climate emergency is provided, followed by the second chapter describing the functionalism of the Paris Agreement and its compliance mechanism, with a brief historic overview that helps answer the question of why stricter enforcement mechanisms were not adopted. The third part explains the game-theoretical framework of climate change and its implications, aiming to answer the question 'how to expect compliance without stricter enforcement mechanisms?'. In this part, there is a description of the compliance mechanisms in international law (retaliation, reputation, reciprocity, outcasting and rewarding), a sketch of the political and economic forces behind state actions and a behavioural analysis regarding compliance. The fourth part focuses on alternatives to the existing mechanisms, such as linkage, trade and carbon border adjustments, climate litigation in national and international courts and the role of non-state actors, such as national movements and cities. Throughout the thesis, insights from behavioural law and economics are brought up. The fifth section intends to answer the second research question of what would be an effective and realistic mix of enforcement mechanisms, drawing a possible solution that encompasses the necessary flexibility for the sovereign states to agree and the commitment required to achieve the 2°C limit. The sixth section concludes.

Keywords: Law and Economics, International Environmental Law, Climate Change, Paris Agreement, Enforcement Mechanisms

JEL classification codes: K33, K32, Q54

Word Count: 12983

I hereby declare and confirm that this thesis is entirely the result of my own work except where otherwise indicated. I acknowledge the supervision and guidance I have received from Professor Anne van Aaken. This thesis is not used as part of any other examination and has not yet been published.

A handwritten signature in black ink, reading "Rafaella Moscalewsky". The signature is written in a cursive style with a large, sweeping initial 'R'.

Rafaella Moscalewsky,

10 August 2022

TABLE OF CONTENTS

1. INTRODUCTION	4
2. THE PARIS AGREEMENT’S COMPLIANCE MECHANISM	6
2.1. Paris Agreement	6
2.2. Compliance Mechanism	10
2.3. Brief historical overview	14
3. HOW TO EXPECT COMPLIANCE?	18
3.1. The game of climate change	19
3.2. Law and Economics Perspective on Compliance Mechanisms in International Law	21
3.2.1. Breaking the Black Box State	25
3.3. Behavioural Explanations of Compliance	27
4. ALTERNATIVES	37
4.1. States	37
4.1.1. Linkage	38
4.1.2. Trade and Carbon Border Adjustments	38
4.2. Non-state Actors	40
4.2.1. International Courts	40
4.2.2. National Courts	41
4.2.3. National Movements	43
4.2.4. Cities	44
5. REALISTIC MIX OF ENFORCEMENT MECHANISMS	46
6. CONCLUSION	48
REFERENCES	50

1. INTRODUCTION

Climate change is one of the biggest challenges of this generation. To stop the warming and avoid tragic effects, humans need to stop emitting greenhouse gases into the atmosphere. The problem is that “virtually every activity in modern life—growing things, making things, getting around from place to place—involves releasing greenhouse gases” (Gates, 2021). The solution for a global problem of this magnitude has to be collective. In Law and Economics terms, the climate is defined as a global public good and represents a common pool resource problem. Its game-theoretical framework is similar to a prisoner’s dilemma constellation, with incentives for parties to free-ride. Traditional rational choice theories, in those circumstances, predict the occurrence of a tragedy led by overconsumption of public resources.

To prevent the tragic scenario from occurring, there has to be an alteration in the payoffs, making cooperation more attractive. Recognising the risks that climate change poses to human life, almost all nations agreed upon a path to mitigate carbon emissions when they signed the Paris Agreement. They made a commitment to keep temperature increase below 2°C, pursuing efforts to limit it to 1.5°C.

The current challenge of international law is to incentivise states to comply with the treaty. Enforcement is said to be the Achilles’ heel of international law because it cannot count on a centralised authority, as it is based on a horizontal system, where every nation is sovereign in its decisions. Plus, the Paris Agreement does not include a traditional enforcement mechanism; instead, it relies on a pledge and review system, under which states submit their Nationally Determined Contributions (NDCs) to reduce emissions.

This thesis aims to answer two research questions: why stricter enforcement mechanisms were not adopted in the Paris Agreement? What would be an effective and realistic mix of enforcement mechanisms for tackling climate change? The research questions are approached theoretically, from a law and economics perspective, including rational choice theory and behavioural insights. The methodology used was literature and database research.

This thesis is organised as follows: the second chapter describes the functionalism of the Paris Agreement and its compliance mechanism, with a brief historical overview that helps answer the research question of why stricter enforcement mechanisms were not adopted. The third part explains the game-theoretical framework of climate change and its implications, aiming to answer the question ‘how to expect compliance without stricter enforcement mechanisms?’. In this part, there is a description of the compliance mechanisms in international law (retaliation, reputation, reciprocity, outcasting and rewarding), a sketch of the political and economic forces behind state actions and a behavioural analysis regarding compliance. The fourth part focuses on alternatives to the existing mechanisms, such as linkage, trade and carbon border adjustments, climate litigation in national and international courts and the role of non-state actors, such as national movements and cities. Throughout the thesis, insights from behavioural law and economics are brought up. The fifth section intends to answer the second research question of what would be an effective and realistic mix of enforcement mechanisms, drawing a possible solution that encompasses the necessary flexibility for the sovereign states to agree and the commitment required to achieve the 2°C limit. The sixth section concludes.

2. THE PARIS AGREEMENT'S COMPLIANCE MECHANISM

2.1. Paris Agreement

The Paris Agreement is the common global framework for dealing with climate change (Bodansky, 2016, p. 300). Drafted in December 2015 by global leaders, it is the international response to the increasing temperature levels and the corresponding adverse effects the globe is now suffering. Its main objective is to hold the increase in the global temperature to less than 2°C above pre-industrial levels, “pursuing efforts to limit the temperature increase to 1.5°C”, to reduce the impacts of climate change (Paris Agreement, Art. 2).

The greatest achievement of the Paris Agreement was to unite 193 nations (192 countries plus the European Union), including developed, developing and least developed countries. The only nations not part of the agreement are four countries in the Middle East (Iran, Eritrea, Libya and Yemen). The United States withdrew from the Paris Agreement in 2017 (Rajamani & Brunnée, 2017). However, the country re-joined during President Biden's administration in 2021 (Mai, 2021). The adherence to the pact is outstanding, especially if compared to its predecessor, the Kyoto Protocol, that only applied to developed countries (Bodansky, 2016, p. 290).

However, this high level of adherence comes together with a more flexible approach (Ibrahim et al., 2021, p. 104). Compared to Kyoto, the Paris Agreement is much softer, working mostly on a voluntary basis (Plumer, 2015) and without any legally binding obligations of result concerning the targets established by each country (Bodansky et al., 2017, p. 1075).

The Agreement's implementation is done by the Nationally Determined Contributions (NDCs), which, as the name points out, are the efforts taken by each

country to reduce carbon emissions. The NDCs are promises made from the individual nations to each other in a bottom-up approach, as the parties determine themselves the amount of their contributions (Bodansky, 2016). According to article 4.2 of the Agreement,

Each Party shall prepare, communicate and maintain successive nationally determined contributions that it intends to achieve. Parties shall pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions.

The article prescribes that each party must “prepare, communicate and maintain” the contributions that it “intends to achieve”. The phrase “intends to achieve” establishes good faith expectations on the parties to actually prepare and deliver their NDCs, nevertheless without imposing a concrete obligation (Rajamani & Brunnée, 2017). The same applies to the second phrase, meaning that parties are obliged to pursue domestic mitigation measures, but the Agreement does not specify which domestic measures must be taken.

The NDCs have to be communicated every five years (art. 4.9), and there is an expectancy of progression in ambition (art. 4.3). In the Preamble of the Agreement, there is also reference to an “effective and progressive response to the urgent threat of climate change”. Although it has been argued that the national contributions have to be progressive in order not to corrode the entire system, the same authors admit that if a party fails to meet its NDCs or even submit a less ambitious subsequent NDC, it is not violating any specific obligation *per se*, as there are no binding obligations of result, solely of conduct (Rajamani & Brunnée, 2017).

In contrast with the bottom-up NDCs, there are top-down mechanisms to promote accountability and foster ambition (Bodansky, 2016, p. 301). The top-down mechanisms

for control and implementation are composed of the transparency framework (art. 13), the global stocktake (art. 14) and the compliance mechanism (art. 15) (Ibrahim et al. 2021, p. 104). While not downplaying the importance of the former two, this thesis focuses on Article 15, the compliance mechanism. However, some words must be drawn on transparency and the stocktake.

As it will soon be addressed, the compliance mechanism is modest. Thus, the transparency framework is the main tool in the Agreement for providing accountability (Bodansky et al., 2017). It is a prerequisite for enforcement and compliance-inducing methods. Transparency enables reputation to play and allows national Courts and other non-state actors to get involved. Article 13 states that “national communications, biennial reports and biennial update reports, international assessment and review and international consultation and analysis” shall all be transparent, providing “a clear understanding of climate change action”.

The NDCs are all public, easily accessed and maintained by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat (art. 4.12). And, as seen before, even though there is no obligation of result, there is a procedural obligation to “prepare, communicate and maintain successive nationally determined contributions” (art. 4.2). Hence, the states are obliged to deliver the NDCs every five years and regularly provide “national inventory report of anthropogenic emissions” and “information necessary to track progress made in implementing and achieving its nationally determined contributions” (art. 13.7(a)(b)).

As will be addressed further, the transparency framework is crucial for tackling climate change. The information provided by all nations helps inform the international community about what has been working and what hasn't, the methods used to mitigate carbon emissions and how ambitious countries are. Above all, it helps nurture an

environment of collaboration, involving reciprocity and reputational concerns. Without transparency, it would be impossible to develop the enforcement alternatives explored in chapter 4.

Article 14 mentions the Conference of the Parties, whose role is to “periodically take stock of the implementation of this Agreement to assess the collective progress towards achieving the purpose of this Agreement and its long-term goals (referred to as the “global stocktake”)”. The first Global Stocktake (GST) started on November 2021 (COP26) for collecting and preparing information and will conclude at COP28 in 2023. The stocktakes happen every five years in a two-year process (UNFCCC). Together with transparency, it also plays a vital role in building cooperation by assessing the progress (or lack thereof) made individually and globally in attaining the NDCs and the broad goals (Ibrahim et al., 2021).

Article 15 is the only one that directly addresses compliance. There is no other mechanism for enforcement mentioned in the Agreement. No fines, no sanctions and no centralised authority with power to coerce. The article provides just a few details about the mechanism: “it will be composed of experts; be facilitative, transparent, non-adversarial, and non-punitive” (Bodansky, 2016, p. 313), and report to the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA), that is the supreme body of the Convention, composed by the representatives of all Parties. Even the modalities and procedures are not defined *ex ante*, they are left to the CMA to develop. In the next section, Article 15 is best explored.

2.2. Compliance Mechanism

There are different approaches in the international community to deal with non-compliance. The responses to non-compliant behaviour can be diplomatic management or coercive enforcement (Kolari, 2003). They range from a facilitative/managerial approach that relies on cooperative problem-solving to a coercive approach that relies on deterrence and pressure to re-establish compliance (Redgwell, 2012). The softer managerial approach is suitable especially when non-compliance occurs as a result of incapacity (Mitchell, 2013), whereas the deterrent method would be suitable in a situation where non-compliance is continuous and deliberated (Oberthür, 2014). The Paris Agreement implemented only the softer approach, in line with other Environmental agreements, having no provisions for situations where countries choose not to comply.

While there are no provisions imposing legal sanctions or punishments, several mechanisms persuade countries to comply. The general mitigation goal to limit global warming to well below 2°C triggers behavioural forces by setting a reference point and a new *status quo*, inducing the states to make efforts to achieve the quantified goal (Rowell & van Zeben, 2016). The provision stipulating the obligatoriness of submitting the Nationally Determined Contributions, even though there is no minimum baseline for the content itself, sets incentives for the countries to submit realistic but ambitious plans, considering that the NDCs are public and easily accessed. Other provisions, like the one enabling joint action to reduce emissions (art. 4.16-4.18), the one clarifying how a “carbon market” should function and the provisions for a linking process (art. 6) work on a voluntary basis, however, are powerful tools for a cooperative system.

Article 15 establishes merely a facilitative mechanism through a committee that acts in a transparent, non-adversarial and non-punitive way, respecting the national capabilities and circumstances of parties. It is worth pointing out that “the principle of

equity and common but differentiated responsibilities and respective capabilities, in the light of different national circumstances” is mentioned in the preamble, signalling that the differential treatment for developed, developing and least developed countries is one important pillar of the Convention. Through this, it seems that one of the biggest goals of the Paris Agreement is to create conditions for countries that lack the capability of implementing greener industries to actually be able to reduce emissions through exchanges with developed countries and help from the international community. However, the Agreement does not provide details about how the system would function.

To explain how the Paris Agreement functions, the CMA, which is composed of representatives of all the parties, adopted a series of decisions referred to as “the Paris Rulebook” (Ibrahim et al., 2021). Rule 20/CMA.1, entitled “Modalities and procedures for the effective operation of the committee to facilitate implementation and promote compliance referred to in Article 15, paragraph 2, of the Paris Agreement” (UNFCCC, 2018), is the one that refers to the implementation of Article 15.

Rule 20/CMA.1 establishes that the mechanism to facilitate implementation and promote compliance consists of a committee (paragraph 1). The Committee is composed of twelve members “with recognized competence in relevant scientific, technical, socioeconomic or legal fields” elected by the CMA, respecting gender and geographical balance (paragraph 5). The members have at least two meetings per year, from 2020 on (paragraph 12). The Committee can act “on the basis of a written submission from that Party with respect to its own implementation of and/or compliance with any provision of the Paris Agreement” (paragraph 20) or might initiate consideration of issues if a party fails to (i) communicate or maintain a NDC under article 4; (ii) submit a mandatory report or communication information under Article 13 or Article 9; (iii) participate in the facilitative, multilateral consideration of progress; (iv) submit a mandatory

communication of information under Article 9 (paragraph 22 (a)). Still, “with the consent of the Party concerned”, the Committee may engage in a “facilitative consideration of issues in cases of significant and persistent inconsistencies of the information submitted by a Party pursuant to Article 13, paragraphs 7 and 9, of the Paris Agreement with the modalities, procedures and guidelines referred to in Article 13, paragraph 13, of the Paris Agreement” (paragraph 22 (b)).

To sum up, the Committee can only act when (1) provoked by the party concerned, (2) when a party fails to submit one of the mandatory documents or (3) when there are persistent inconsistencies of the information submitted by a party in the mandatory reports, if the concerned party consent. Paragraph 23 stresses that the content of the contributions, communications, information and reports will not be addressed by the Committee.

After the process is initiated, the party may participate in the discussions of the Committee, except when it is elaborating the decision (paragraph 25 (a)). When deciding, the Committee will identify “the appropriate measures, findings or recommendations” (paragraph 28). The “appropriate measures” are listed in paragraph 30. Therefore, in regard of what the Committee can do, the Rulebook brings a list, containing: “engage in dialogue with the Party concerned”, “assist the party concerned in the engagement with the appropriate finance, technology and capacity-building bodies or arrangements”, “make recommendations” and “issue findings of fact in relation to matters of implementation and compliance”.

As it is possible to see on the list, the Committee has limited action, being able to dialogue, assist or make recommendations, leaving the final decision whether to implement or not to the party concerned. The Committee can also identify systemic issues regarding implementation and compliance involving a number of parties and bring these

issues to the attention of the CMA. However, if the systemic issue relates to only one individual party, then the Committee cannot address that matter, according to paragraph 34.

There are no provisions for the case where the concerned party does not comply even after receiving the Committee's recommendation or assistance. The Convention has no enforcement mechanism in the traditional meaning. The Rulebook emphasises that the Committee "shall neither function as an enforcement or dispute settlement mechanism, not impose penalties or sanctions and shall respect national sovereignty" (paragraph 4).

To sum up, the committee competences are all about capacity-building. It relies on the softer/facilitative approach, focusing on countries that do not have the capabilities to achieve the targets, helping them to develop institutional, financial and technical capacities to be able to comply. This soft approach is essential to the achievement of the main goal, guaranteeing that all the parties that want to comply have access to the means to do so. However, the big issue concerns the major emitters, including the developed countries and China (Blokhin, 2022), to whom incapacity is not really an obstacle. If those countries do not comply, there are no direct-response mechanisms.

The lack of strong non-compliance response mechanisms is a result of the negotiations of the Agreement. Some parties wanted strong-enforceable rules, whereas others lobbied for a purely voluntary agreement without a compliance mechanism (Ibrahim et al., 2021). Considering that the goal was to have universal membership, due to the nature of the problem (collective action problem), the softer approach prevailed.

The questions that remain are: with obligations of conduct, not results, no legally binding commitments regarding the content of NDCs and no sanctions for non-compliant parties, how is that supposed to work? What are the incentives given to the parties? Why didn't the drafters impose stricter enforcement mechanisms in order to change the

playoffs for the countries? To start answering these questions, a brief historical overview is needed.

2.3. Brief historical overview

The answer to the last question of ‘why didn’t the drafters impose stricter enforcement mechanisms?’ is very straightforward: countries would not have agreed to bind themselves to a strict pact. However, this answer was obtained after a trial-and-error process over the years.

Past attempts to create a legally binding climate treaty with more elaborate enforcement regimes ended up failing for not being able to ‘convince’ the states to ratify and stick to them.

The first important agreement, though not intended to tackle climate change, was the Montreal Protocol (1987), which successfully stopped the depletion of the ozone layer. It was followed by the UN Framework Convention on Climate Change (UNFCCC) (1992), the first global treaty to address climate change. The UNFCCC established an annual forum, known as the Conference of the Parties (COP), where nations discuss, monitor and review the implementation of policies to mitigate the concentration of greenhouse gases in the atmosphere (Maizland, 2021). These meetings produced the Kyoto Protocol (adopted in 1997, but entered into force in 2005) and the Paris Agreement (2015).

The Kyoto Protocol, the first legally binding climate treaty, followed the Montreal Protocol’s trend, which was a huge success in saving the ozone layer. The latter functioned based on targets to quickly reduce Chlorofluorocarbons production based on input from scientists; it was legally binding and made special allowances for poorer countries (Pulmer, 2015). Expecting similar success, the Kyoto Protocol entered into

force in 2005, with legally binding targets for developed countries and a more lenient approach towards developing countries. The outcome was that the US Senate refused to ratify the treaty with complaints that China did not have to restrain its emissions (nor other developing countries), allowing industries to simply migrate to developing countries with no legally binding obligations. The United States and Canada withdrew, with no penalties imposed, and developing countries like China and India grew so fast that global emissions skyrocketed, despite the cuts made by developed countries (Pulmer, 2015).

After Kyoto, in Copenhagen, 2009, UN negotiators tried to create a treaty requiring all countries to make binding commitments. However, China and India refused to submit legally binding proposals. They complained that the developed countries should be held more accountable for their past emissions and should have a more significant burden to reduce emissions now (Pulmer, 2015).

Lessons learned from the previous attempts were that (i) it will be impossible to tackle climate change without global efforts, including developed, developing and least developed countries, and (ii) legally binding targets are likely to drive away some fearful countries. That is why the Paris Agreement was drafted the way it was. Treaty drafters became aware of the problems of having a very strict approach and decided to rely on a largely voluntary treaty, with no “frightening” sanctions that would reduce adherence to the pact. The hope is that, with *quasi*-unanimous consent, cooperation and peer pressure will encourage nations to be ambitious and contribute to saving the climate (Pulmer, 2015).

Another important consideration is that dealing with international law is considerably different from dealing with national law. International law is deeply connected with politics, limiting the extent to which international relations can be

governed by purely legal procedures and discourse (Abbott & Snidal, 2000). Domestic law counts on an institutional setup ready to prosecute offenders and enforce legal norms, whereas in international law there is no hierarchy nor a central authority, and the countries rarely delegate authority to independent courts of general and mandatory jurisdiction. Even when they bind themselves to legal commitments, countries are reluctant to delegate authority and tend to do so only to bodies subject to their control (Abbott & Snidal, 2000). The effectiveness of treaties, therefore, is not directly related to the 'strength' of legal norms but rather to political and behavioural reasons.

One more relevant point is that the Paris Agreement does not need to be the last treaty on climate change. Paris is a precursor for change. The drive for universal membership may necessitate some concessions, such as an adaptation period until parties can bring themselves into compliance (Chayes & Chayes, 1993, p. 195). Chayes & Chayes point out that a common strategy for obtaining universality is to start with a low obligational regime and increase the level of regulation as experience grows (1993, p. 195). It is called the 'convention-protocol strategy' and was adopted in other environmental regimes, such as the Ozone Layer protection, which started with the Vienna Convention (1985), containing no substantive obligations and developed to the Montreal Protocol (1987), with binding goals. As pointed out by the past Executive Secretary of the UNFCCC, Christiana Figueres:

The Paris Agreement cannot solve climate change on its own. However, it does unmistakably define the direction of travel towards limiting global average temperature rise to a range between 1.5 ° and below 2 °C, to avoid the worst impacts of climate change. There is much left to be achieved in order to make that vision a reality, but what is clear is that progress is by now

unstoppable...we are not at our destination yet, but we are irreversibly on our way. (Figueres, in Klein et al., 2017).

Obtaining essentially unanimous consent from the international community was a big achievement in the battle against climate change. The answer to the research question of why stricter enforcement mechanisms were not adopted in the Paris Agreement is that if stricter enforcement mechanisms were adopted, the treaty would not have so many ratifications. States are not ready to relinquish sovereignty to a central authority and be subjected to supranational control and sanctions. A softer approach was needed to build consensus among nations that can stop climate change. For a collective action problem on a global scale, the first step is that the entire world is united and agrees upon the goals. The second step is to guarantee cooperation. In the next chapter, the focus will be on this next step, describing the factors that lead to more cooperation.

3. HOW TO EXPECT COMPLIANCE?

The Paris Agreement obtained almost unanimous consent from the international community, a remarkable achievement in the battle against climate change. The challenge of universal membership was successfully accomplished, yet many other challenges are on the horizon. One of them is guaranteeing compliance without risking a backlash with massive withdrawal from nations. Obtaining signatures and ratification is, without a doubt, an important step, but it does not guarantee compliance. States ratify treaties in t_0 and choose to comply (or not) in t_1 . Deciding upon membership has different motivations if compared to the decision of compliance. Many theories try to explain why and the circumstances in which states comply with their international obligations. For now, for simplicity reasons, the rational choice assumption will be used, which prescribes that compliance occurs when the costs of violating the obligation outweigh the benefits of compliance. Therefore, international law can alter states' behaviour by changing their payoffs, raising either the costs of violating obligations or the benefits of compliance.

Article 15 is the only mention of a compliance mechanism in the entire Paris Agreement. It does not provide sanctions for non-compliance, nor does it provide any means of coercion to a central authority. From a traditional rational choice perspective, it would be doomed to failure, as apparently does not account for any changes in countries' payoffs, meaning that deviating from cooperation and free-riding in other countries' contributions would still be the dominant strategy. Some scholars even refer to the Agreement and NDCs as cheap talk (Caparrós, 2016, p. 351). In the previous section, the question of 'why not stricter enforcement mechanisms?' was answered. This chapter focuses on the question of how to expect compliance and cooperation, having to rely on an Agreement 'with no teeth' (Ibrahim et al., 2021).

3.1. The game of climate change

Climate change is a global commons problem. A stable climate is a global public good, subject to collective action problems (van Aaken, 2018). In this case, there are two rational reasons for inaction. The benefits of mitigation “are global and distant”, whereas “costs are local and immediate” (Gollier & Tirole 2017, p. 80). Individual incentives for taking efforts to combat climate change and reduce carbon emissions are low, considering that still nowadays carbon-emitting activities bring enormous economic gains, while the mitigation gains are spread among the countries (Posner & Sykes, 2013, p. 231).

In scenarios where goods are non-excludable and rivalrous, like the world’s climate (or greenhouse gas concentrations in the atmosphere), individuals have incentives for overusing the common-pool resources and, if there are no sufficient positive or negative sanctions (no foreseeable punishment or reward for respectively violating or conforming to norms), according to the traditional rational choice view, the “tragedy of the commons” (Hardin, 1968) will be inevitable. Thus, this rational choice approach predicts that, with no enforcement mechanism capable of changing the incentive to overuse, the emission of greenhouse gases will keep occurring and, as a result, the planet will overheat.

The game theoretical framework usually attributed to a global public good constellation is similar to a prisoner’s dilemma, where rational individuals, in a non-repeated game, end up not cooperating, even if cooperation would lead to the best aggregate welfare (van Aaken, 2018). Each player has an incentive not to contribute and free-ride, leading to overuse and unequal distribution of resources. In climate change issues, the problem is aggravated due to the weakest link principle: one player’s failure influences the outcome for all the other players, meaning that everybody has to commit in order to achieve the common goal.

Rationalists accept that, in cases where there are repeated interactions, cooperation can be achieved in particular scenarios (Di Guida et al., 2021; Koremenos et al., 2001). However, they anticipate enforcement problems (due to the high costs for the punisher, leading to a sanctioners' dilemma), free-riding (in the other's contributions and also on enforcement measures) and cheap talk, expecting that the promises end up being unenforceable or underenforced (van Aaken, 2018). Thus, for rationalists, agreements with weak enforcement mechanisms are expected to fail, having no impact on behaviour (Posner & Sykes, 2013).

This pessimistic model, based on rationalist assumptions, is not supported by empirical evidence (van Aaken, 2018; Ostrom, 1999). There are many other factors that contribute to cooperation but are left out of the rational choice theory.

Elinor Ostrom, Nobel Prize winner in 2009, studied the common-pool dilemmas and found that it is possible to achieve results that are "better than rational" through mechanisms that enhance reciprocity, reputation and trust (1998). She found that self-interest can be overcome with trust, conditional commitments and trustworthy reputation of the participants. She also states that communication and monitoring individual contributions are key to cooperation. All this can and should be taken into account in treaty design.

To save the commons, users must cooperate (Cramton, P. C et al., 2017), and cooperation is fostered by those three key elements pointed out by Ostrom: trust, reciprocity and reputation. There is a lot of critique of the Paris Agreement for not being "strong enough" to foster reciprocity and avoid free-riding (Cramton, P. C et al, 2017). However, for there to be cooperation, before even thinking about mechanisms to increase trust and reciprocity, it is first necessary to obtain the consensus of the international community. A treaty "perfectly" designed to punish free-riders, with strong sanctions and

a central authority, would not have any adherence from the international community. Furthermore, there is evidence that ‘weak enforcement mechanisms, like measures of assistance, monitoring and persuasion, are actually less costly and more effective than strong coercive sanctions (Chayes & Chayes, 1993, p. 205). Those measures, allied with transparency, enhance reciprocity, trigger reputational concerns and, ultimately, may even trigger other states and non-state forces to combat free-riding.

3.2. Law and Economics Perspective on Compliance Mechanisms in International Law

In International Law, there is no hierarchy between the states and no central authority to dictate and enforce norms. So how is International Law effectuated in prisoner’s dilemma constellations?

The mechanisms to promote compliance in the international system are reciprocity, reputation, retaliation, outcasting and rewarding. All of them alter countries’ payoffs by either adding costs for non-compliance or awarding benefits for compliance.

Retaliation is a direct sanction against the violator (Guzman, 2002). It can take part as retorsions, reprisals and economic, diplomatic or military counter-measures (van Aaken & Simsek, 2021). The issue with retaliation is that sanctioning incurs costs, causing a second-order prisoner’s dilemma, the so-called sanctioners’ dilemma. Due to the costs of sanctioning, states prefer to free-ride on others, meaning that one would expect sanctioning only in severe violations. However, behavioural findings suggest that, due to fairness concerns, states actually punish violators more often than rationalists would predict (van Aaken, 2014, p. 472).

Reciprocity, used as a compliance-enhancing tool, happens when, in response to a violation, a state withdraws its own compliance. This type of reciprocity is called negative reciprocity and is unsuitable for agreements involving human rights and

environmental treaties because instead of promoting, it would destroy cooperation. If the response for one country not complying is others also stopping to comply, cooperation breaks down completely. Instead, for conditional cooperation, it is essential that, if one player deviates, the others reassure their commitments. Positive reciprocity, on the other hand, is the benefit obtained from the practice of cooperation and is desired in public goods scenarios. Behavioural economics points out that reciprocity can be learned and is actually one of the key ingredients to enhancing returns from collective action (van Aaken, 2018, p. 73). Reciprocal behaviour may have different motivations: can be motivated by future benefits (weak reciprocity) or can reflect “a desire for balance driven by comparison and matching, and is related to equality and fairness concerns” (strong reciprocity) (van Aaken, 2018, p. 74).

Reputation is defined as judgments about an actor’s past behaviour used to predict future behaviour – if a state tends to violate international obligations, it will have a bad reputation, leading other states to exclude it from future opportunities, whereas if a state tends to comply, it will be awarded a good reputation, being trustworthy for future opportunities (Guzman, 2002; van Aaken 2014). According to Guzman, the power to commit exists in domestic settings because there are courts to enforce contracts; in the international domain, however, states have to rely on imperfect international sanctions (in a horizontal system) and reputational effects (2002, p. 1846). This is why reputation plays a big role internationally: it serves as a commitment device. In repeated games, reputation concerns are a main driver for compliance. The more credible the country is, the better off it is (Guzman, 2002).

Outcasting is another non-violent compliance mechanism, which sanctions non-compliant states by denying them the benefits of cooperation and membership or excluding them from using markets (Hathaway & Shapiro, 2011). The non-compliant

state is pushed away from the “club”, being temporarily deprived of its benefits (van Aaken & Simsek, 2021, p. 202). For a public good constellation, outcasting seems to be a great tool, once it converts a non-excludable and rivalrous good to an excludable non-rivalrous good in terms of consumption, the so-called club goods (van Aaken, 2018). The theory supporting it comes from James Buchanan (1965) and his “economic theory of clubs”, one of the conclusions being that “one important means of reducing the costs of securing voluntary cooperative agreements” is “introducing excluding devices” (p. 14). This possibility of exclusion creates strong incentives for compliance and is not as costly as retaliation, for example, mitigating the sanctioner’s dilemma. Outcasting serves as an excluding device, punishing violators, and also as a reward for compliant parties, that enjoy the benefits of being part of the club. The formation of a club also triggers behavioural forces, creating positive in-group reciprocity (van Aaken, 2018). Outcasting, as a means for compliance, can be used by states in the international arena, but also can be carried out by non-state actors, as, for example, happened in the Financial Action Task Force (FATF), where private banks started following recommendations to combat money laundering and terrorism financing, black-listing non-compliant states, in a technique called labelling, where reputational concerns walk in (van Aaken, 2010), and in the Kimberley Process Certification Scheme (KPCS) in the trade in conflict diamonds, where state and non-state actors (NGOs, diamond industry and traders) joined forces, restricting trade to only Kimberley certified participants (states and industries must adhere to the process). If a participant does not comply with the KPCS or is caught trading with non-certified participants, it may be excluded from the scheme (van Aaken, 2010). Those who are not part of the club do not get the certification. Diamond consumers, before buying, have an easy way to assess whether the product was obtained with or without the protection of human rights. This idea can be extended to carbon products, including end-consumers in the enforcement chain.

Rewarding is another tool for enhancing compliance. For something to be perceived as a reward, it has to be an improvement if compared to the target's baseline of expectations (van Aaken & Simsek, 2021). An advantage received may not be perceived as a reward if it is lower than the target's expectations. If someone expects a hundred-euro bonus and ends up receiving just fifty, this bonus will not be perceived as a reward. The opposite is also true, if someone expects to be fined one hundred euros and ends up having to pay only fifty, this fine will not be perceived as a sanction. Thus, the removal of a penalty incorporated in the baseline is perceived as a reward, and the removal of a reward is perceived as a penalty (van Aaken & Simsek, 2021). It means that treaty drafters should be extra careful when defining the baseline of expectations, due to the huge impact that framing has on one's perceptions. The rewards can be internal (benefits that integrate the treaty) or external (additional gains of cooperating) and they can be applied when one state enters the treaty or when a state complies with the treaty (van Aaken & Simsek, 2021). It is important to keep in mind that having a state to sign and ratify a treaty does not necessarily mean that it is going to comply with it. That is why compliance-inducing methods are so crucial for the success of a treaty. Compliance rewards can be the use of the treaty's mechanisms (e.g. article's 15 compliance committee), being re-accepted after exclusion (redemption) or, as external rewards, access to financial assistance outside the treaty and good reputation due to compliance, granting future gains from cooperation (van Aaken & Simsek, 2021). According to behavioural findings, rewarding has a more positive effect on cooperation than negative sanctioning. That is because a reward is perceived as a positive incentive whereas a penalty as a negative one, penalties are more likely to create resistance and counter-threats whereas rewards tend to be reciprocated, and penalties have the potential to increase conflicts whereas rewards tend to decrease them (van Aaken & Simsek, 2021).

3.2.1. Breaking the Black Box State

The analysis above considers the state as a unitary actor with stable preferences for simplicity reasons. However, it is important to point out the complexity behind states' decisions and break the 'black box state' (van Aaken, 2018). So far, national goals have been considered as given, and the model tries to explain how to adequate the payoffs so that national goals are aligned with compliance with international law. Nonetheless, national goals are rather a result of individuals' and groups' aggregate decisions, driven by their personal (economic and altruistic) interests, lobby groups, heuristic and cognitive biases. When breaking the black box, one encounters a complex environment, encompassing altruistic and self-centred individuals and groups, with different interests, ideas and goals. This two-level theorising is relevant for the current analysis because climate change is not only fought in the international arena but rather needs a system encompassing state and non-state actors, at the international and domestic levels.

The Paris Agreement universal membership was possible not because states' leaders became aware of the danger out of a sudden, but as a result of a process involving good treaty drafting, a shift in technology (allowing cheaper non-carbon options for industries), a shift in the market (that is now looking for long-term secure investments, meaning that they need to decarbonise activities), and a shift in the private sector (captains of industry, insurance companies, investors, city leaders) that began to understand the risks of climate change and the benefits of combating it (TED, 2016). This long-term viability search necessarily includes decarbonising industries and activities, and the market actors are increasingly becoming more aware of that. With those shifts in the market and private initiative, and with all their support, national governments became aware that tackling climate change is in their national interests. (TED, 2016) Domestic

actors were behind states entering the Paris Agreement, and so they need to be involved in its compliance stage.

Alongside the rational choice theory explanation for compliance, it is possible to analyse the situation through a public choice perspective if the unitary state assumption is relaxed. Looking at the international arena as a two-level game, with domestic actors determining international actions, it is clear that the interest groups that gain from carbon intense activities put a lot of pressure to bar domestic legislation intended to curb carbon emissions. On the other side, there are NGOs and other groups such as the Fridays for Future, that advocate for more sustainable production methods. Aligned with those, due to the recent impacts of the high temperatures (fires and droughts), the banking and the insurance sectors are increasingly pressing for change.

A rational choice perspective would dictate that the more powerful and better-organized interest groups would win this battle. Although the entire community would gain in the long run with more sustainable industries, individuals are not organised enough to lobby. Public choice theory, guided by the assumptions that behaviour is motivated by individual self-interests and interest groups are always seeking to maximise their own profits or wellbeing, suggests that the interest groups with more lobby power (better organised and with stronger economic incentives to take action) are the ones that end up capturing the legislators, being able to pass/bar regulation that is beneficial to the group.

The prediction for climate change-related regulations is that, since the benefits are highly dispersed and costs for taking action are too high, mitigating regulation will be hard to promote (den Hertog, 2012, p. 45). However, this pessimistic view does not take into account movements that are increasingly taking place: the insurance and banking sectors are beginning to pressure for climate-friendly regulation (due to their prospective

losses because of fires and droughts), NGOs are pressuring their governments to engage in climate action and national courts are already making use of the Paris Agreement to impose obligations to their governments. This shows that there are ways to effectuate the Paris Agreement and tackle climate change, relying not only on the states but also on the market's reaction.

3.3. Behavioural Explanations of Compliance

Until this point, the analysis has been done assuming that states decide rationally whether or not to comply with their obligations, based on a calculus involving costs and benefits. The unitary state assumption was already relaxed in the previous section, with a brief explanation of the internal forces that determine national goals and states' actions. In this section, the rational assumption is put at stake.

Experimental and empirical research has demonstrated that individuals and groups systematically deviate from rational choices (Zamir & Teichman, 2018). The deviations may occur due to bounded rationality, bounded willpower and bounded self-interest (van Aaken, 2014, p. 427). Bounded rationality implies that preferences are not static and humans make mistakes. Framing, loss aversion, the endowment effect and the status quo bias are some examples of biases that interfere with humans' preferences. Bounded willpower is associated with the self-control problem. Experiments show that people's discount rates tend to sharply decrease over time, what is called "hyperbolic discounting", which leads to inconsistency in behaviour over time (van Aaken, 2014, p. 431). Bounded self-interest is based on plenty of experimental research that has demonstrated that individuals are not only motivated by their material self-interest, but also by altruistic and social preferences (van Aaken, 2014, p. 432).

After breaking up the black box state and looking at the “Lego pieces”, it becomes clear that states’ actions are not solely determined by individuals acting in a utility-maximizing, self-interested manner. Politicians, bureaucrats and policymakers’ decisions are influenced by heuristics and biases. According to van Aaken, groups are subject to the same biases as individuals, differing only in intensity (some biases are more or less intense in groups if compared to individuals) (2014, p. 446). Osberghaus (2017) suggests applying prospect theory to climate change policies. He is backed up by empirical evidence that collective action is often better described by prospect theory than expected utility theory (Osberghaus, 2017, p. 913). States *per se* do not have feelings, however, they are governed by individuals, who have their own rationality and biases. Therefore, a state’s decision is not expected to be one hundred percent rational. It is rather influenced by bounded rationality, bounded willpower and bounded self-interest.

In international relations, there is a two-way road, where, on the one side, internal actors determine the state’s behaviour in the international arena and, on the other side, international law plays a role in internal processes. This is why it is crucial to incorporate behavioural findings into the study of international law. The idea is not to discard the rational-choice theoretical framework but to ameliorate the comprehension of human and state behaviour by incorporating physiological insights (Zamir & Teichman, 2018, p. 18). Beyond contributing to a better understanding of behaviour, psychological insights can also be used as another tool inside the toolbox for better treaty drafting aiming to increase cooperation (van Aaken, 2018, p. 79).

International legal rules have more impact than rational choice would predict. Studies show that people have preferences for policies that are in accordance with international law, to the extent that legal commitments, once they are made, change public opinion and create pressure towards compliance with international law (Chilton and

Linos, 2020, p.7). Therefore, the fact that a state signed and ratified a treaty at t_0 already has an influence on the state's behaviour at t_1 , making it likely that the state's conduct will be in line with the obligations undertaken.

Abram Chayes and Antonia Chayes, studying methods to improve compliance, argue that most of the treaty violations are not deliberate. They are a result of “(1) ambiguity and indeterminacy of treaty language, (2) limitations on the capacity of parties to carry out their undertakings, and (3) the temporal dimension of the social and economic changes contemplated by regulatory treaties” (1993, p. 188). The authors advocate that, contrary to what rationalists would think, compliance with treaties is not entirely guided by a calculation of interests. When entering treaties, states already make a choice to commit, otherwise, they would not devote time and energy to prepare, draft, negotiate and monitor the obligations (1993, p. 186). Therefore, ways of improving compliance include clearer norms to solve ambiguities, technical and financial assistance to solve capacity deficits and transparency to make it likelier that, over time, national policies are brought into line with the international goals (1993, p. 204). The expectation is that, by systematically eliminating all the circumstances that might cause unintended non-compliance, the miscreant states (that are deliberately violating the norms) will feel forced to change their practices and comply (because the option would be admitting bad faith, which is very uncomfortable even for a powerful state) (1993, p.205).

The Paris Agreement already internalises those lessons by incorporating the transparency framework and provisions accounting for differences in capacity among developed, developing and least developed countries. The expectation is that, by providing means for capacity-building, allied with reputational concerns triggered by transparency, the states will be led to comply. The pressure is expected to come from the

international community (cap and trade systems) and non-state actors (cities, NGOs, national movements and Courts).

Despite the huge importance of capacity-building mechanisms, relying solely on them is insufficient for the urgent problem that climate change represents. Even taking into account altruistic preferences and bounded self-interest, the game theoretical scenario favouring free-riding is still a reality and poses a threat to cooperation. Nonetheless, the free-riding threat can be avoided by incorporating some findings from empirical research that lead to “better than rational” outcomes (van Aaken, 2018, p.6). As Ostrom (1998) points out, the tools to overcome temptations of short-run self-interests are reciprocity, reputation and trust. Based on that, van Aaken (2018) indicates four factors that lead to cooperation in behavioural experiments and proposes that they are incorporated in treaty design. They are:

(1) internalized norms of cooperation, sustained by emotions such as guilt and shame and underlying moral norms such as fairness concerns; (2) concern for the specific behavior of others, such as reciprocity; (3) communication and trust-building; and (4) sanctions imposed on non-cooperators. (p. 72).

The Paris Agreement already incorporates some of them. By setting the goal of keeping the temperature increase below 2 degrees Celsius, pursuing efforts to limit to 1.5 degrees, it creates a new baseline for measuring policy failures (Rowell and van Zeben, 2016). Rowell and van Zeben advocate that the new baseline is now perceived by decision-makers as the new status quo, meaning that failures to meet the new target will be perceived as losses (2016). Rowell and van Zeben's hypothesis is aligned with prospect theory.

Prospect theory posits that outcomes are not perceived in absolute terms (expected utility) but as gains or losses, and those gains or losses are defined in comparison to a reference point, which can be the status quo or an entitlement (Kahneman & Tversky, 1979; van Aaken, 2018, p. 272). Studies have shown that potential losses weigh more than potential gains for the human brain (Tom et al., 2007). Because losses loom larger than gains, people have a tendency to avoid loss, and this is called loss aversion. Something will be considered a loss depending on the reference point (the expectation baseline). This is why framing and default rules are so relevant, to the point that they can alter behaviour. It has been shown that opt-in and opt-out clauses make a difference in choices (Johnson & Goldstein, 2003). Behavioural studies demonstrate that, *ceteris paribus*, individuals prefer conforming to the status quo rather than challenging it, the so-called “status quo bias” (Korobkin & Guthrie, 2003). The status quo bias indicates that even if there will be gains from eventual deviations from the status quo, the shift itself is already somehow undesired because the disadvantages of shifting from the current status quo loom larger than the advantages (Kahneman et al., 1991). The perceived status quo works as a reference point and something will be considered a loss or a gain depending on what is seen as the reference point. If states perceive their carbon-intensive industries as the status quo, getting rid of them may have additional difficulty due to loss aversion. However, if states acknowledge that they are likely to lose from climate change (costs to combating fires, droughts, floods, lack of food, human and animal life costs, environmental costs, etc) that may generate a different reference point. In this context, framing is crucial, because it brings to light different perspectives and may change how policy-makers draft their climate policies.

Framing is also relevant for negotiations, policy and treaty drafting. Framing effects occur when different ways of describing the same options change the choices

people make. Those effects were explored in many experiments, proving that people are indeed influenced by different framings (Ellingsen et al., 2012; Tversky & Kahneman, 1985). It happens because frames influence beliefs, and beliefs influence behaviour (van Aaken, 2018, p. 72). Framing is capable of activating moral sentiments. By expressing what is ‘the right thing to do’, the Paris Agreement triggers behavioural forces, bringing guilt and shame to the equation. This internal punishment of guilt or shame provides an intrinsic reason for action (van Aaken, 2018, p. 73).

Different framings influence state behaviour by “directly changing the decision-making environment of individuals vested with political power” (Teichman & Zamir, 2019, p. 1266), and it is done through framing options as gains or losses, framing negotiations as trust games rather than prisoner’s dilemma to increase cooperation (van Aaken, 2018) or, for example, by setting a new reference point or a new status quo. All this impacts the decision-making process of politicians.

Thus, the ambitious goal set by Paris Agreement is not just cheap talk, it actually has a powerful psychological impact on policymakers, which are triggered to conform to the perceived new status quo. The quantified goal (2°C) works as a focal point, which is intended to be achieved and can be used to measure policies’ success. Failures to achieve the quantified target implicate loss aversion (Rowell & van Zeben, 2016, p. 52). Rowell & van Zeben explain that unanimous consent, the choice of a quantitative goal (as opposed to a qualitative one e.g. dangerous anthropogenic change) and the selection of a two-tiered goal (admitting a deviation between 1.5-2 degrees) are indicators that a new status quo was set. The framing of the agreement and its goals is aligned with the first factor indicated by van Aaken, as the two-degree goal is an effective way of internalizing norms of cooperation (by creating a new status quo and consequentially triggering policymakers to conform).

Other powerful mechanisms in the Paris Agreement, that are also aligned with behavioural findings, are the global stocktake and the transparency framework. Together, they enhance communication and trust and trigger reciprocity and reputational concerns. Communication helps to achieve efficient results (van Aaken, 2018). It facilitates cooperation by (1) transferring information between the parties about what would be the optimal strategy; (2) exchanging mutual commitment; (3) increasing trust, affecting expectations of others' behaviour; (4) adding more value to the subjective payoff structure; (5) reinforcing prior normative values and (6) developing group identity (Ostrom, 1998, p.7). Trust is also important for maintaining cooperation. The more trust states have in each other, the more they will be willing to cooperate. The global stocktake, as a process of taking stock of the implementation of the agreement, triggers social comparison and pressures the states' decision-makers, spurring them to action. If a state is found not to be complying with its targets, this could serve as a focal point for media coverage, public discourse and NGO activity, generating demand for reform of domestic policies (Teichman & Zamir, 2019, p. 1275). The mechanisms work in the domestic setting, as just explained, as well as internationally. A country found to be deliberately not complying will be granted a bad reputation, being set aside for future cooperative opportunities.

Reciprocity, as one of the tools of inducing compliance, in its negative form (withdrawing compliance in response to a violation) is not useful nor desired in public goods settings. However, positive reciprocity (the benefit obtained from the practice of cooperation) is a useful tool, especially in its strong form. Weak reciprocity is self-interested action (cooperative or retaliatory) aiming for future benefits, whereas strong reciprocity is the desire for balance by comparison and is related to fairness concerns (van Aaken, 2018, p. 74). Behavioural studies in public good games demonstrate that players

do punish violators, even when it is costly to do so, due to fairness considerations. Ostrom et al. (1999) characterized the different types of actors involved in common-pool resource problems. They can be the ones that never cooperate in prisoner's dilemma situations (the typical free-riders), the conditional cooperators, that are willing to cooperate as long as they are not exploited by free-riders, the ones that are willing to initiate cooperation hoping that others will reciprocate and the ones that are genuinely altruists aiming to achieve greater collective goals (p. 279). The key to universal cooperation is assuring that incentives to free-ride are minimised, guaranteeing conditional cooperators will still be willing to cooperate.

To combat opportunistic free-riding behaviour (and to keep reciprocity among the states), sanctions remain necessary. As Ostrom points out, reciprocity, alone, cannot completely solve common-pool resource problems (1997, p. 17). Field studies have shown that successful common-pool regimes count on monitoring institutions and graduated sanctions (Ostrom, 1997, p. 17). Monitoring is done by the submission of the NDCs, the global stocktake, the transparency framework and the compliance committee. Sanctioning is the tricky part. As already seen, the Agreement does not have a sanctioning mechanism, because the states would simply not agree to it and the main goal was to achieve unanimity. Nevertheless, climate change combating does not end with the Paris Agreement. It is a precursor for change. Thus, it remains crucial to analyse enforcement possibilities that go further than the Agreement, complementing it. The decision 1/CP.21, which resulted from the Conference of the Parties that adopted the Agreement, recognises that all efforts are needed. It expressly welcomes all non-party stakeholders' efforts to address and respond to climate change, "including those of civil society, the private sector, financial institutions, cities and other subnational authorities". The decision also recognises that parties "need to strengthen the knowledge, technologies, practices and

efforts of local communities and indigenous peoples, as well as the important role of providing incentives through tools such as domestic policies and carbon pricing”.

According to rational choice theory, decentralised forms of enforcement may seem weak. However, behavioural studies suggest that mechanisms like outcasting, rewarding and symbolic sanctioning are actually effective in global public good situations. Whereas selfish or greedy sanctions may destroy cooperation, sanctions to combat free-riding are perceived as fair, not only maintaining but also enhancing cooperation among the parties (van Aaken, 2018, p. 76). Even purely symbolic sanctioning, such as publicising non-compliance, already has an effect on parties, that are sensitive to the evaluation of others and fear for their reputation. Positive sanctioning, best known as rewarding, can be used in climate policies to increase the perceptiveness of fairness in the system, by, for example, funding ambitious initiatives. Outcasting is a powerful mechanism in international law, especially in public good constellations, because it converts non-excludable goods to excludable ones, creating club goods. The creation of groups with internal benefits induces an endowment effect in the participants, which then are led to comply with the groups’ rules not to be excluded from the benefits.

One example of a successful outcasting mechanism was the one adopted by The Montreal Protocol, which placed limits on the amount of ozone-depleting substances each member state could produce and consume. The success of the treaty was in great part attributed to its trade provisions, limiting member states to trade only with other member states. After a great number of countries were in, the others were left with no choice but to join. The mutual gains from trade within the club induced compliance (van Aaken & Simsek, 2021, p. 210). The potential exclusion works as a penalty, while the possibility of re-joining the club works as a reward, and both combined induce compliance (van Aaken & Simsek, 2021, p. 210). This mechanism is transferable to carbon activities.

Although at first, some countries might not want to join, after some big players agree to be in, it is a matter of time until all the countries join.

In conclusion, the Paris Agreement (perhaps inadvertently) incorporated behavioural insights, which are likely to lead countries to increasingly align their policies with the collective goals. The softer approach used and the pledge-and-review mechanism, which includes a five-year cycle involving “multilateral consideration of each party’s progress in implementing its NDC, a “global stocktake” of collective progress towards meeting the Agreement’s goals, and updated NDCs by each party” (Bodansky, 2017, p. 709) are expected to exert peer pressure on parties to comply with the provisions and increase ambition over time. The Agreement also counts on reputational concerns, reciprocity, internal and external rewards and enables outcasting mechanisms to emerge. The Agreement alone might not be able to deter climate change. However, it signals the cooperative intentions to achieve the collective goals and triggers states and non-state actors to take action.

4. ALTERNATIVES

In the previous chapter, four factors that enhance cooperation in public good constellations were mentioned. The Paris Agreement already incorporates most of them, as it: (i) internalises norms of cooperation by setting goals that work as reference points, (ii) triggers emotions such as guilt and shame by pointing out what is the right thing to do, (iii) fosters reciprocity and reputational concerns by demanding submission of NDCs and making them transparent, (iv) caters to those who do not have the means to comply, by providing capacity-building tools and (v) enhances communications and trust-building, by the meetings and discussions involving the global stocktake process. The only point left out is sanctioning for non-cooperators. The agreement, by itself, does not provide traditional forms of sanctions. But it induces powerful mechanisms, involving state and non-state actors, domestically and internationally.

Sanctions imposed on non-cooperators are crucial for more cooperation among nations. Considering that the states are not ready to give away some of their sovereignty to a central authority, the international community has to find alternatives to punish free-riders. Based on the literature, this chapter suggests some alternative enforcement mechanisms to enhance cooperation, that encompasses state and non-state actors.

4.1. States

Beyond signing, ratifying and complying with the Paris Agreement (regulating internal carbon emissions), states also have a role in enforcing its norms. Altruistic states that actually care about the climate or even states that are already suffering the effects and bearing the costs of climate change have enough incentives to take action in convincing others to do their part. They can do so by restricting trade, forming clubs and concluding other treaties with the aim of reducing carbon emissions.

4.1.1. Linkage

One of the biggest problems concerning climate change is getting all the countries to consent and commit to the measures that must be taken to solve the problem. One way of guaranteeing adherence is through linkage. It is a decentralised enforcement mechanism, that works to attract ‘not-so interested’ states. When a treaty lacks incentives to make a certain state comply with its terms, an external reward can make compliance more attractive, and linkage is a way of providing external rewards (van Aaken & Simsek, 2021). Issue linkage is defined as “the simultaneous discussion of two or more issues for joint settlement” (Poast, 2013, p. 287). It is a bargaining tactic to create benefits for those parties who otherwise would not find so much value in one agreement and also motivates states to remain committed (Koremenos et al., 2001). Including trade provisions in treaties aiming to reduce greenhouse gas emissions may induce all parties to uphold their environmental obligations (Poast, 2013, p. 287). The Montreal Protocol’s success in protecting the ozone layer was mainly attributed to its trade provisions. If it worked for ozone-depleting substances, surely it has the potential to succeed in mitigating carbon emissions.

4.1.2. Trade and Carbon Border Adjustments

Carbon border adjustments are instruments to prevent carbon leakage as the mitigation policies in one country or region become more ambitious. Leakage occurs when companies move their production in response to stricter policies to countries that are more lenient towards carbon emissions, resulting solely in allocational changes, but not quantitative ones. Carbon border adjustments intend to prevent leakage by levying a border tax or requiring importers to surrender a quantity of carbon permits (Condon & Ignaciuk, 2013).

The European Union proposal for a carbon border adjustment mechanism is a pioneer (COM/2021/564-final). It intends to “equalise the price of carbon between domestic products and imports”, prevent leakage, and “ensure that the EU's climate objectives are not undermined”. It also “motivates foreign producers and EU importers to reduce their carbon emissions” (European Commission, 2021).

Beyond preventing leakage, carbon border adjustments create incentives for trade partners to also decrease their carbon emissions. As the prices in the region within the Carbon Border increase (either due to carbon tax or due to the decline in allowances in cap-and-trade systems), a carbon border adjusts the price of imports so they will reflect how much carbon was used in production. Therefore, foreign producers and importers are motivated to reduce their carbon emissions, to be able to compete inside the market within the border. The bigger the market within the border, the more incentives it generates for its trade partners to reduce emissions.

Whereas there are many theoretical studies regarding Carbon Border Adjustments, the empirical evidence of their effects is limited due to the recency of the initiatives. While some studies advocate that Carbon Borders are essential to the development of climate policies (for leakage avoidance and leverage effects) (Helm et al., 2012), others warn about its possible negative effects on trade, with the danger of initiating a ‘cascading protectionism’ with retaliatory responses (Erixon, 2021; Zachmann, 2020). A reasonable approach seems to be the one suggested by Mehling et al. (2017). The authors mention that even an imperfect carbon border has advantages over other instruments to address leakage, as long as it avoids discrimination and differentiation, ensuring a fair, inclusive and transparent process. The authors also say that, despite their benefits in the short run, carbon borders should not be used in the long run, due to their complexity and trade-offs. However, they acknowledge that insofar as carbon borders are successful, their utility

should wane over time, as climate ambition among trading partners should converge, diminishing leakage rates (Mehling et.al, 2017, p. 51).

4.2. Non-state Actors

Non-state actors also have a role in enforcement. Climate change is combated domestically, with a change in the industry, consumption, how energy is made and how people and products are transported. In public goods or commons constellations, market mechanisms must complement the traditional enforcement instruments of international law. This can be done by “designing self-enforcing regulatory network constellations and by using consumers’ tastes” (van Aaken, 2010, p.7). Domestic and international adjudication initiated by private parties is also on the rise.

4.2.1. International Courts

There is no international court to address environmental issues specifically. The United Nations climate change regime is based on negotiations rather than litigation. This regime is justifiable, considering that evidence demonstrates that states are more likely to feel a stronger commitment and comply with norms to which they have agreed than those imposed from the outside (Bodansky, 2017 p.706). It is also argued that the reputational costs of breaking an agreement might be higher than the costs related to non-compliance with a judicial decision (Bodansky, 2017 p.706). Another advantage of negotiation over litigation is that the former is based on reciprocity, which makes states more likely to reciprocate or retaliate in response to non-compliance. Despite the advantages of negotiation, climate change adjudication can be used as a complement, as long as it does not hinder the negotiating process (Bodansky, 2017 p. 692).

In the absence of an international environmental court, climate change issues can be (and have been) brought on the basis of human rights violations, in Human Rights

Courts. There have also been petitions under the World Heritage Convention, on the grounds that climate change affects sites like the Great Barriers Reef (Bodansky, 2017 p. 700). Bodansky argues that, potentially, cases could also be brought to the International Tribunal for the Law of the Sea (for damage to the marine environment), the World Trade Organization (WTO) (for climate change policies' implications in trade law), the International Centre for the Settlement of Investment Disputes (ICSID) and the Permanent Court of Arbitration (for investment claims related to climate change) and the International Court of Justice (the one with broader jurisdiction).

Understanding adjudication as a complement (not a substitute) for negotiations creates room for improvement in the system, as international courts and tribunals are actors that occupy a large space in forming global public consciousness (Sands, 2016). The International Courts may address issues not directly addressed in negotiations, for example, by establishing a common language for comparing and evaluating the NDCs. A judicial opinion on the criteria used for assessing NDCs would serve as a focal point with legal status, thus, would likely be observed by the parties (Bodansky, 2017, p. 710).

Bodansky also mentions that advisory opinions from Courts are preferable to contentious cases, due to the more general effect they have. The author notes that contentious proceedings could possibly have negative spillover effects on negotiations, whereas an advisory opinion would clarify and elaborate relevant international norms. However, the author acknowledges that contentious cases concerning climate change might become appropriate (2017, p. 711).

4.2.2. National Courts

National Courts also have a role in enforcement. The mitigating targets set by the countries have to be transposed to domestic law and this is usually done by the executive

and legislative branches. If the government fails to implement regulations compatible with the mitigating targets, one way of making them act is through domestic litigation. Climate litigation goes beyond NGOs suing their government. Nowadays, there are many cases against companies, in which plaintiffs are asking for adjustments to carbon-reducing production methods, injunctive relief for stopping activities or claiming damages. National judges are increasingly being called upon to ‘help shape climate law, police existing obligations, and provide guidance through the application of domestic and international legal principles’ (Band and Fulton, 2017, p.1).

Some cases brought to national courts can be found on the website <<http://climatecasechart.com/>>, which provides databases of climate change case law. There are suits against public authorities and private entities, and the plaintiffs are individuals, groups, municipalities or organizations. Climate change litigation, both domestic and international, face formidable challenges, such as the difficulties of establishing causation and the problem of allocating liability to particular actors (Bodansky, 2017 p. 704). For this reason, attempts to impose liability on private entities have not yet been so successful. Nevertheless, as the number of cases increases, as well as the number of studies on climate change and technological tools are developed, it may be possible in the near future to identify culprits (Band & Fulton, 2017, p. 10).

Suits against governments have been more successful. A leading example is the *Urgenda v. The Netherlands* case, where a Dutch regional court found that the government had breached its duty of care by setting a reduction target below the necessary to prevent climate change (the target was a 20% reduction), and ordered the Dutch government to adopt at least a 25% reduction target by 2020 from 1990 levels (Bodansky, 2017 p. 700). This case serves as persuasive authority for other jurisdictions (Band and Fulton, 2017, p. 3).

4.2.3. National Movements

National movements, such as activists and organisations, are able to “open the eyes” of civil society by exposing the dangers of climate change and, thus, pressure governments to redirect public policies towards a carbon-mitigating path. In the United Kingdom, for example, groups like Friends of the Earth, Campaign against Climate Change and other environmental NGOs were successful in their demands regarding the adoption of national emission targets, opposing new carbon-intensive infrastructure and increasing funding for renewable energy (Nulman, 2016, p.4). The success was achieved through campaigns that captured the media’s attention and mobilised public opinion, pressuring decision-makers to develop legislation compatible with mitigation goals.

Climate change movement has been experiencing an accelerating growth rate since 2003, accompanied by an increase in the number and type of actors involved (Caniglia et al., 2015, p.261). Nowadays, not only non-profit entities are engaged, but also trade unions and associations, faith-based organisations and for-profit organisations. Individuals are becoming aware of the danger of climate change and companies are beginning to understand that they can profit from switching to ‘greener’ production methods.

According to estimates, in the United States, even without regulatory backing, businesses have the potential to reduce emissions by one to four billion tons every year below current levels for over a decade (Banda, 2018, p. 328). Initiatives including ‘(a) company emissions and climate risk disclosure; (b) voluntary commitments to reduce emissions; and (c) carbon labelling’ are emerging as a result of rational cost-benefit calculations and evolving social norms (Banda, 2018, p. 387). Although private initiatives alone are not sufficient to tackle the problem, private governance plays an important role “in closing the ambition deficit in this period by increasing government accountability

and facilitating the *de facto* domestic implementation of the Paris Agreement in the U.S. and elsewhere” (Banda, 2018, p. 329).

4.2.4. Cities

Along with companies, investors, courts and national movements, cities’ actions are essential for redressing the ambition deficit left by the states (Banda, 2018, p. 338). A collective action problem requires collective action solutions at all levels of governance. Cities have the advantage of being closer to the citizens compared to the central government, being able to tailor the policies to local needs. Different cities in the same country might be engaged in different activities, requiring different mitigating policies.

The importance of city action for enforcement and implementation was expressly recognised by the parties to the Paris Agreement, which invited all non-party stakeholders to “scale up their efforts and support actions to reduce emissions” and to “demonstrate these efforts via the Non-State Actor Zone for Climate Action [“NAZCA”] platform” (decision 1/CP.21). Cities are not only affected by international norms, such as the Paris Agreement, but also, they are shaping developments on the global level (Aust & Nijman, 2021, p.6).

Aust & Nijman draw attention to the Climate Leadership Group C40, which is “a global network of mayors taking urgent action to confront the climate crisis”, now counting on 96 member cities (C40 Cities Climate Leadership Group, 2022). They make themselves present in international conferences, have alliances with other actors (the World Bank and corporate actors) and are “heavily imbued in the language of global governance” (Aust & Nijman, 2021, p.4). The movement became so strong that the New York City Mayor, who was the chair of the C40, was nominated in 2014 to be the UN Secretary-General’s first Special Envoy for Cities and Change, confirming the role cities have in combating climate change (Nijman, 2016, p. 5).

Cities and mayors are increasingly becoming more active in implementing international law, autonomously from state action, which by itself already has positive impacts on mitigating outcomes, but also spurs other actors to also engage in climate action.

5. REALISTIC MIX OF ENFORCEMENT MECHANISMS

An effective and realistic mix of enforcement mechanisms includes state and non-state actors, internationally and domestically. Alone, none of the alternatives are enough, but combined they create a powerful mechanism, able to enforce international law norms.

In the international realm, the Paris Agreement includes facilitative mechanisms that provide developing and least developed countries with means for capacity-building, helping them develop institutional, financial and technical capacities to comply. The system pressures countries toward compliance, as it would ruin one's reputation to admit non-compliance for selfish economic reasons.

After guaranteeing means for compliance, the problem that remains is free-riding. To combat free-ride opportunistic behaviour, backed up by the transparency framework, the global stocktake and the compliance committee as monitoring mechanisms, systems involving reputation, rewarding and outcasting are likely to prevail due to their lower costs compared to coercive retaliatory sanctions. Through a Behavioural Law and Economics analysis, these systems are not only less costly but also better at inducing positive reciprocity and cooperation.

The Paris Agreement is a precursor for change and is just the beginning of a decarbonising era, opening space for other international treaties linking, for example, trade and carbon footprint. Initiatives such as carbon border adjustment mechanisms and linking climate change issues to trade have the potential to create a carbon club, generating great incentives for states and industries to reduce their carbon activities.

As Ingrid Wuerth points out, states, themselves, can enforce international norms. They may use retaliation to punish violating states and, due to fairness concerns, they actually do it even at some costs. Diplomatic pressure, threats to cut off diplomatic

relations, limiting monetary assistance and public statements of displeasure are other means that states can use to enforce international norms (Wuerth, 2019, p. 126). International tribunals and arbitration are also included in the spectrum. States may use the WTO law and dispute resolution system “to authorize trade sanctions to generate compliance” (Wuerth, 2019, p. 126).

Allied with the decentralised enforcement mechanisms by countries, the market and private forces also have a role in enforcement. Individuals and corporations have been increasingly using adjudication to enforce international law, either against states or companies. Breaking up the black box state and bringing the business sector into the equation build additional incentives for compliance. The creation of clubs involving state and industry obligations to mitigate carbon usage, similar to the Kimberley Process Certification Scheme or the Financial Action Task Force, would generate incentives for states and industries to reduce their carbon activities in order to be able to participate in the market. To effectuate sanctions against international violators, the system must permeate the network of all actors involved, including market forces (van Aaken, 2009, p.54).

National movements, NGOs, cities and consumers also serve as enforcement mechanisms. Guaranteeing information disclosure (carbon footprint certificates) pressures industries based on end-consumers preferences. NGOs and national movements lobby their government for more regulation, and cities, with their proximity to the citizens and their transnational networks of local governments, cover a governance gap left out by states.

Therefore, the climate emergency does not rely only on international mechanisms but is rather supported by a mix of national and international systems, encompassing domestic and international actors.

6. CONCLUSION

The Paris Agreement is a precursor for change and triggers states and non-state actors to take action. To succeed, it needs to induce all states to take on individual mitigation targets that, combined, are consistent with the 2°C warming limit. The Agreement's purpose is to assist countries in agreeing on permissible emissions through negotiations.

Paris does not have an enforcement mechanism, which would be considered a failure to some rational choice scholars, who refer to it as just cheap talk. Nevertheless, the absence of an enforcement mechanism does not mean that the goals will not be achieved. In fact, an enforcement branch would not even be compatible with Paris, as there are no substantive state commitments (Zahar, 2017, p. 81). Instead, the Agreement relies on a report and review system, which triggers reciprocity and reputation concerns and is likely to impose sufficient pressure on states to comply with their assumed obligations. The agreement also provides capacity-building mechanisms, catering for those who do not have the means to comply. Beyond that, Paris structures a framework for further negotiation, which will be needed to guarantee that states will stick with their increasingly ambitious mitigation targets.

By the time the Agreement was signed, it would not have been possible to get countries to agree on a final "burden-sharing formula" (Zahar, 2017, p. 97), such as a global cap or a global price for emissions. However, the Agreement settled a new status quo, guiding states to pursue the 2°C increase limit goal (Rowell and van Zeben, 2016). The soft obligations regarding mitigation and means of implementation create good faith expectations among parties (Rajamani, 2016, p. 358), the transparency framework stimulates reciprocity and reputational concerns and the global stocktake process enhances communication and trust, altogether spurring cooperation.

Paris had to find a balance between commitment and flexibility. Flexibility was needed to achieve broad participation and to make the Agreement last. Commitment is necessary to assure compliance. Leaving the contributions' content to the parties' discretion was needed to achieve unanimous consent, and procedural obligations guarantee commitment (Voigt, 2016, p. 161). The treaty's flexibility regarding substance does not mean that states are free from pressure to determine their contributions. States have unilateral and regional means to induce other states to mitigate their carbon emissions. Linking climate change issues to trade and developing carbon border adjustments are ways of doing so. The past years have shown that nonstate actors are also active in fighting climate change, either through national movements or adjudication in national or international courts. Moreover, other levels of governance are getting involved, as cities and city networks are becoming prominent in international debates and climate action.

Further challenges concerning the formulation of adequate domestic policies, compatibilities between trade restrictions and WTO law and imposing liability on private actors are still on the horizon. Contributions from science and technology will also play critical roles in combating climate change. To tackle the collective problem, collective action is needed from all different levels of governance and knowledge fields. There is still a long path to achieving the net-zero carbon goal; however, the good news is that 'we are irreversibly on our way' (Figueres, in Klein et al., 2017).

REFERENCES

- Abbott, K. W. & Snidal, D. (2000). Hard and Soft Law in International Governance. *International Organization*, 54, 421-456.
- Aust, H. P., & Nijman, J. E. (2021). *Research Handbook on International Law and Cities*. Edward Elgar Publishing.
- Banda, M. L. (2018). The bottom-up alternative: The mitigation potential of private climate governance after the paris agreement. *Harv. Envtl. L. Rev.*, 42, 325.
- Banda, M. L., & Fulton, C. S. (2017). Litigating Climate Change in National Courts: Recent Trends and Developments in Global Climate Law. *Environmental Law Reporter*, 47.
- Blokhin, A. (2022). The 5 Countries That Produce the Most Carbon Dioxide (CO2). Investopedia. Accessed July 7, 2022 in <https://www.investopedia.com/articles/investing/092915/5-countries-produce-most-carbon-dioxide-co2.asp>.
- Bodansky, D. (2016). The Paris Climate Change Agreement: A New Hope? *American Journal of International Law*, 110(2), 288-319.
- Bodansky, D. (2017). The role of the international court of justice in addressing climate change: Some preliminary reflections. *Ariz. St. LJ*, 49, 689.
- Bodansky, D., Brunnée, J., & Rajamani, L. (2017). *International climate change law*. Oxford: Oxford University Press.
- Buchanan, J. M. (1965). *An Economic Theory of Clubs*. *Economica*, 32(125), 1–14. <https://doi.org/10.2307/2552442>.
- C40 Cities Climate Leadership Group. (2022). Accessed August 05, 2022 in <https://www.c40.org/>.

Caniglia, B. S., Brulle, R. J., & Szasz, A. (2015). Civil society, social movements, and climate change. *Climate change and society: Sociological perspectives*, 1, 235-268.

Caparrós, A. (2016). The Paris Agreement as a step backward to gain momentum: Lessons from and for theory. *Revue d'économie Politique*, 126(3), 347–356. Accessed July 22, 2022 in <http://www.jstor.org/stable/44687390>.

Chayes, A., & Chayes, A. H. (1993). On compliance. *International organization*, 47(2), 175-205.

Chilton, A., & Linos, K. (2021). Preferences and Compliance with International Law. *Theoretical Inquiries in Law*, 22(2), 247-298.

Condon, M. and A. Ignaciuk. (2013). Border Carbon Adjustment and International Trade: A Literature Review. *OECD Trade and Environment Working Papers*, No. 2013/06, OECD Publishing, Paris, <https://doi-org.eur.idm.oclc.org/10.1787/5k3xn25b386c-en>.

Cramton, P. C., MacKay, D. J., Ockenfels, A., & Stoft, S. (2017). *Global carbon pricing: The path to climate cooperation*. Cambridge, MA: The MIT Press.

Conference of the Parties Serving as the Meeting of the Parties to the Paris Agreement, Report of the Conference of the Parties Serving as the Meeting of the Parties to the Paris Agreement on the Third Part of its First Session, Held in Katowice from 2 to 15 December 2018, at 61, U.N. Doc. FCCC/PA/CMA/2018/3/Add.2. Accessed July 20, 2022 in <https://unfccc.int>.

den Hertog, J. (2012). Economic theories of regulation. *Chapters*.

Di Guida, S., Han, T. A., Kirchsteiger, G., Lenaerts, T., & Zisis, I. (2021). Repeated interaction and its impact on cooperation and surplus allocation—an experimental analysis. *Games*, 12(1), 25.

Ellingsen, T., Johannesson, M., Mollerstrom, J., & Munkhammar, S. (2012). Social framing effects: Preferences or beliefs?. *Games and Economic Behavior*, 76(1), 117-130.

Erixon, F. (2021). *Europe's carbon border adjustment mechanism: time to go back to the drawing board* (Ser. Ecipe policy brief, no. 2021, 14). ECIPE, European Centre for International Political Economy.

European Commission (2021). Proposal for a Regulation of The European Parliament and of The Council Establishing a Carbon Border Adjustment Mechanism, COM/2021/564 final. Accessed August 03, 2022 in <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52021PC0564>.

Frank, C. (2014). Pricing Carbon: A Carbon Tax or Cap-And-Trade?. *Brookings*. Accessed August 02, 2022 in <https://www.brookings.edu/blog/planetpolicy/2014/08/12/pricing-carbon-a-carbon-tax-or-cap-and-trade/>

Gates, B. (2021). *How to avoid a climate disaster: the solutions we have and the breakthroughs we need*. Knopf.

Gollier, C., & Tirole, J. (2017). 10 Effective Institutions against Climate Change. *Global Carbon Pricing*, 165.

Guzman, A. T. (2002). A compliance-based theory of international law. *Calif. L. Rev.*, 90, 1823.

Hardin, G. (1968). The tragedy of the commons: the population problem has no technical solution; it requires a fundamental extension in morality. *Science*, 162(3859), 1243-1248.

Hathaway, O., & Shapiro, S. J. (2011). Outcasting: enforcement in domestic and international law. *Yale Lj*, 121, 252.

Helm, D., Hepburn, C., & Ruta, G. (2012). Trade, climate change, and the political game theory of border carbon adjustments. *Oxford review of economic policy*, 28(2), 368-394.

Ibrahim, I. A., Maljean-Dubois, S., & Owley, J. (2021). The Paris Agreement Compliance Mechanism: Preparing For COP 26 In Glasgow And Beyond.

Johnson, E.J & Goldstein, D. (2003). Do defaults save lives? *Science* 302 (5649), 1338-1339.

Kahneman, D., Knetsch, J. & Thaler, R. (1991). Anomalies: the endowment effect, loss aversion, and status quo bias. *Journal of Economic Perspectives*, 5 (1), 193-206.

Kahneman, D. & Tversky, A. (1979). Prospect Theory: an analysis of decision under risk. *Econometrica* 47, 263.

Klein, D.R., Carazo, M.P, Doelle, M., Bulmer, J. & Higham, A. (2017). *The Paris climate agreement on climate change: analysis and commentary*. New York: Oxford University Press.

Koremenos B, Lipson C and Snidal D (2001) The rational design of international institutions. *International Organization* 55(4): 761-799.

Korobkin, R., & Guthrie, C. (2003). Heuristics and biases at the bargaining table. *Marq. L. Rev.*, 87, 795.

Kolari, T. (2003). Constructing Non-Compliance Systems into International Environmental Agreements—A Rise of Enforcement Doctrine with Credible Sanctions Needed. *Finnish Yearbook of International Law*, 14, 205-232.

Mai, H.J. (2021). *U.S. Officially Rejoins Paris Agreement On Climate Change*. NPR. Accessed July 10, 2022 in <https://www.npr.org/2021/02/19/969387323/u-s-officially-rejoins-paris-agreement-on-climate-change?t=1656938736588>.

Maizland, L. (2021). Global Climate Agreements: Successes and Failures. Council on Foreign Relations. Accessed July 20, 2022 in <https://www.cfr.org/backgrounder/paris-global-climate-change-agreements>.

Mehling, M., van Asselt, H., Das, K., Droege, S., & Verkuij, C. (2017). Designing Border Carbon Adjustments for Enhanced Climate Action. *Climate Strategies*. Accessed August 03, 2022 in <http://www.jstor.org/stable/resrep16316>.

Mitchell, R. B. (2013). *International environmental politics*. *International environmental politics*, 2, 801-826.

Nijman, J. E. (2016). Renaissance of the city as global actor. The role of foreign policy and international law practices in the construction of cities as global actors. *The Role of Foreign Policy and International Law Practices in the Construction of Cities as Global Actors (February 1, 2016)*. TMC Asser Institute for International & European Law, 2.

Nulman, E. (2016). *Climate change and social movements: civil society and the development of national climate change policy*. Springer.

Oberthür, S. (2014). Options for a compliance mechanism in a 2015 climate agreement. *Climate Law*, 4(1-2), 30-49.

Osberghaus, D. (2017). Prospect theory, mitigation and adaptation to climate change. *Journal of Risk Research*, 20(7), 909-930.

Ostrom, E. (1998). A behavioral approach to the rational choice theory of collective action: Presidential address, American Political Science Association, 1997. *American political science review*, 92(1), 1-22.

Ostrom, E., Burger, J., Field, C. B., Norgaard, R. B., & Policansky, D. (1999). Revisiting the commons: local lessons, global challenges. *science*, 284(5412), 278-282.

Paris Agreement to the United Nations Framework Convention on Climate Change, 12 December, 2015, T.I.A.S. No. 16-1104.

Plumer, B. Past Climate Treaties Failed. So the Paris Deal Will Try Something Radically Different. *VOX*. Accessed July 10, 2022 in <https://www.vox.com/2015/12/14/10105422/paris-climate-deal-history>.

Poast, P. (2013). Issue linkage and international cooperation: An empirical investigation. *Conflict Management and Peace Science*, 30(3), 286–303. Accessed July 12, 2022 in <http://www.jstor.org/stable/26275360>.

Posner, E. A., & Sykes, A. O. (2013). *Economic foundations of international law*. Harvard University Press (PS).

Rajamani, L. & Brunnee, B. (2017). The legality of downgrading nationally determined contributions under the Paris agreement: lessons from the US disengagement. *Journal of Environment Law*, 29, 537-551.

Redgwell, C. (2012). Facilitation of compliance. *Promoting Compliance in an Evolving Climate Regime*, Cambridge University Press, Cambridge, UK, 177-193.

Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on the third part of its first session, held in Katowice from 2 to 15 December 2018. UN Doc FCCC/PA/CMA/2018/3/Add.2 (2019). Accessed June 20, 2022: https://unfccc.int/sites/default/files/resource/cma2018_3_add2_new_advance.pdf.

Rowell, A. & van Zeben, J. (2016). A new status quo? the psychological impact of the paris agreement on climate change. *European Journal of Risk Regulation*, 7, 49.

Sabin Center for Climate Change Law. (2022). Climate Change Litigation Databases. Accessed July 27, 2022 in <http://climatecasechart.com/>

Sands, P. (2016). Climate change and the rule of law: Adjudicating the future in international law. *Journal of Environmental Law*, 28(1), 19-35.

Teichman, D., Zamir, E., (2019). Nudge goes international. *European Journal of International Law*, 30(4), 1263–1279.

TED (18/04/2016), Christiana Figueres: The inside story of the Paris climate agreement. YouTube. Accessed July 24, 2022 in https://www.ted.com/talks/christiana_figueres_the_inside_story_of_the_paris_climate_agreement.

Tom, S., Fox, R., Trepel, C., Poldrack, R., 2007. The neural basis of loss aversion in decision-making under risk. *Science* 315, 515–518.

Tversky, A., & Kahneman, D. (1985). The framing of decisions and the psychology of choice. In *Behavioral decision making* (pp. 25-41). Springer, Boston, MA.

United Nations Framework Convention on Climate Change. Topics: Global Stocktake. Accessed June 20, 2022 in: <https://unfccc.int/topics/global-stocktake/global-stocktake>.

UNFCCC, C. (2015, June). Decision 1/CP. 21, Adoption of the Paris Agreement.

UNFCCC, NAZCA platform. Accessed August 01, 2022 in <https://climateaction.unfccc.int/>.

van Aaken, A. (2009). Effectuating Public International Law through Market Mechanisms? *Journal of Institutional and Theoretical Economics (JITE) / Zeitschrift Für Die Gesamte Staatswissenschaft*, 165(1), 33–57. Accessed August 03, 2022 in <http://www.jstor.org/stable/40752735>.

van Aaken, A. (2010). Trust, Verify, Or Incentivize? Effectuating Public International Law Regulating Public Goods Through Market Mechanisms. In *Proceedings of the ASIL Annual Meeting* (Vol. 104, pp. 153-156). Cambridge University Press.

van Aaken, A. (2014). Behavioral international law and economics. *Harvard International Law Journal*, 55(2), 421-482.

van Aaken, A. (2018). Behavioral aspects of the international law of global public goods and common pool resources. *American Journal of International Law*, 112(1), 67- 79.

van Aaken, A. (2018). Rationalist and Behavioralist Approaches to International Law. *International Legal Theory: Foundations and Frontiers* (Cambridge University Press, 2019, Forthcoming).

Van Aaken, A., & Simsek, B. (2021). Rewarding in International Law. *American Journal of International Law*, 115(2), 195-241.

Voigt, C. (2016). The compliance and implementation mechanism of the Paris Agreement. *Review of European, Comparative & International Environmental Law*, 25(2), 161-173.

Wuerth, I. (2019). Compliance. In *Concepts for International Law* (pp. 117-126). Edward Elgar Publishing.

Zachmann, G., & McWilliams, B. (2020). *A European carbon border tax: much pain, little gain*. Brussels, Belgium: Bruegel.

Zahar, A. (2017). A bottom-up compliance mechanism for the Paris Agreement. *Chinese Journal of Environmental Law*, 1(1), 69-98.

Zamir, E. & Teichman, D. (2018). *Behavioral law and economics*. Oxford University Press.