From Court to Policy: The Spillover Feature of Climate Litigation

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Introduction

"Climate change is a common concern of humankind". This principle from the Paris Agreement, cited in the *KlimaSeniorinnen v. Switzerland* (2020) climate litigation case, underscores that climate change is not just a national issue, but a global crisis affecting humanity. In the latest IPCC report (2023), it is argued that climate change will increasingly threaten human health, ecosystems, and economies without urgent and equitable action, with severe adverse consequences for current and future generations. The economic repercussions are already evident: between 2000 and 2019, climate change contributed to damages worth $2.86 trillion across 185 extreme weather events (Newman & Noy, 2023). A 1°C increase in temperature is expected to reduce US GDP by 1.2%, with losses rising to 2–20% in the poorest counties by the late 21st century (Hsiang et al., 2017). According to the Stern Review, one of the most authoritative references in environmental economics, the benefits of early and strong action on climate change far exceed the economic costs of inaction; mitigating these risks demands robust, deliberate policy measures to reduce emissions (Stern, 2007).

The legal system and its practices play a central role in this action. Given that the law establishes the overarching normative framework that shapes political, social, technological, and economic activities, it should be the primary domain to adapt to the new challenges posed by climate variability (Giabardo, 2021). Particularly relevant is the role of climate lawsuits, which can be regarded as a "port of entry" (Osofsky, 2007) for dialogue between private actors and sovereign states. Litigation in courts promotes social consensus by allowing litigants to articulate their concerns

and have their voices heard (Lahav, 2019, Niehaus, 2023). It can often help address gaps in the regulatory structure and stimulate regulatory activity (Viscusi 2002). However, the traditional legal paradigms of tort law, which rely on clear and direct injuries, do not well align with climate impacts' diffuse and global nature. While these challenges should be resolved through political and regulatory mechanisms rather than litigation alone (Kysar, 2010), courts serve an essential impulse function by sending legislators signals urging them to take action. This work focuses on this "spillover" feature of climate litigation: its ability to have an impact beyond the existing legislative system and stimulate legal innovation, that is to say, public goods. In this respect, litigation, in line with other institutions, has the role of promoting public interest through private action.

In the academic literature, the subject of climate litigation has been examined primarily in the domain of legal studies, with scholars approaching the topic from a variety of perspectives. Central themes include the way legal frameworks have adapted in response to new challenges posed by climate change (Hunter, 2009, Peel et al., 2012), the role and use of international law and treaties (Toussaint, 2021,Voigt, 2023), the rise of human rights-based litigation (Yoshida & Setzer, 2020, Savaresi & Auz, 2019) and the intersection of law, policy and climate governance (Beauregard et al., 2021, Kotzé et al., 2024, Peel & Osofsky, 2013). As the phenomenon becomes increasingly pervasive, scholarly interest is shifting towards its economic ramifications. Recent empirical investigations suggest that, under specific conditions, climate litigation has the potential to amplify broader sustainability risks, as evidenced by its impact on stock returns (Dulak & Gnabo, 2024, Wu & Zhong, 2024).

The present study is situated within the debate on the normative role of climate litigations, considering these disputes for their potential to challenge existing climate policies and for their ability to attract global attention. An illustrative case is that of asbestos, where litigation has raised awareness of risks that were previously poorly regulated, leading to stricter safety standards (Ramello, 2012). A parallel can be drawn with the tobacco industry, where it led to a de facto regulation, encompassing restrictions on marketing and advertising, as well as increases in cigarette prices. Analogous dynamics have been observed for lead paint, breast implants and firearms (Viscusi 2002). A prominent aspect in this sense is the so-called "radiating effect" of tort law cases, often entailing far-reaching cultural and political consequences (Bloom, 2013). This phenomenon is evident in strategic climate litigation, where cases are brought to exert pressure on governments and corporations to mitigate, adapt, or compensate for climate-related damages. The primary objective of these

legal actions is thus to influence public policy. An illustrative case is *Milieudefensie et al. v. Royal Dutch Shell plc.* (2019), where the Hague District Court imposed, for the first time, a specific mitigation obligation on a private company: it required Shell to cut global emissions by 45% by 2030 compared to 2019 levels. This ruling went beyond existing cap-and-trade regulations and governmental mitigation policies, interpreting Shell's duty of care under Dutch tort law, referring to international soft law instruments such as the UN Guiding Principles on Business and Human Rights (Macchi & van Zeben, 2021). However, even if in this work we do not delve into the crucial theme of the separation of powers, the intersection between the political and judicial spheres is intricate. When courts succeed in compelling states to adopt more stringent regulations, there is no guarantee that the measures imposed would be the most effective, as judges could be ill-equipped to devise comprehensive policies on climate change mitigation. An example is provided by the landmark case *Urgenda Foundation v. State of the Netherlands* (2015): while it set a precedent for strategic public climate litigation by holding the Dutch state accountable for insufficient mitigation efforts, its real long-term impact remains uncertain (Mayer, 2023). Ultimately, though these cases raise public awareness, this does not necessarily translate into more substantial political support for mitigation: litigation alone is insufficient to produce the deep and systemic transformations needed to combat climate change effectively. Courts can play a strategic and sometimes catalytic role, but their interventions remain bounded by institutional and procedural limitations. A strong national-level regulatory response is needed to effectively handle climate change (Peel, 2007).

Even if the "governance role" of courts and, more broadly, the relation between climate litigation and environmental regulation have been examined in the literature, prior studies have primarily focused on conceptual discussions (Burgers, 2020, Lando, 2024) or, if it was an empirical investigation (Eskander et al., 2021, Kovács et al., 2024), it was of a different scope and purpose. To the best of our knowledge, no study has empirically investigated the association between *de jure* and *de facto* environmental regulation and the presence of climate change litigation cases on a cross-country and longitudinal basis. This work aims to fill this gap by constructing a 33-year panel dataset (1990–2023) covering 64 countries, examining how the occurrence of cases correlates with changes in the stringency of environmental policies over time.

The structure of the work is as follows: Section 1 provides a literature review, outlining the main streams in which scholarly discourse on climate litigation has evolved. It presents the thematic development of the literature, highlighting emerging trends

and the most frequently discussed cases. Section 2 introduces the theoretical framework and delineates the research hypotheses. There, the distinctive characteristics of litigation as a regulatory instrument are emphasised, examining specific case studies, turning then to the particular debate on the role of climate litigation. Section 3 presents the data and methods, including our empirical approach and research findings, while Sections 4 and 5 are dedicated to discussion and future developments, respectively.

1 Literature Review

1.1 Environmental and Climate Law

Climate disputes pose a significant challenge to the judicial system. The prevailing legal frameworks were designed to address social problems of a different nature, scope, and intensity. Consequently, judicial bodies are found "ill-equipped" to manage such claims. According to Kysar (2010) traditional damage paradigms, which assume clear and direct injuries, do not well align with the pervasive and global nature of climate impacts. The distinctive features of climate change have thus necessitated innovation in the law, resulting in the development of creative new strategies at both national and international levels (Hunter, 2009). In this regard, a significant trend is the use of rights-based arguments in court, which frame climate change as a violation of fundamental rights. This approach has gained international traction, especially in light of the recognition of the human rights dimensions of climate change in the Paris Agreement. Peel & Osofsky (2018) define the current as a "rights turn" in climate litigation. Alongside the rights-oriented trajectory, climate change litigation has also evolved through claims of liability, particularly in cases where states or private actors are held responsible for causing or failing to mitigate the impacts of climate change. However, this tendency has sparked broader questions around the separation of powers and the appropriate boundaries of judicial intervention. The increasing involvement of courts in the climate regulation sphere raises concerns about their democratic legitimacy, especially when judicial decisions appear to step into domains traditionally reserved for legislative or executive bodies (Burgers, 2020, Zeben, 2015). Nevertheless, climate litigation should not be understood in isolation from the wider institutional and policy context. By bringing climate issues into the courtroom, litigation can raise public awareness while also fostering "needed interactions across levels of government and different time periods" (Osofsky, 2010). In this sense, litigation has emerged as part of a broader transformation in climate law and policy, shaped by a shift toward multi-level governance.

As Peel et al. (2012) note, international negotiations frequently prove ineffective in delivering binding commitments, thus prompting an escalating reliance on legal strategies across various governance levels. Litigation contributes to this evolving landscape by helping to establish transnational liability principles and by interacting with key international instruments, such as the Paris Agreement.

1.2 International Law and Treaties

An increasing number of actors are turning to international courts, tribunals, and treaty bodies to promote climate accountability and clarify state obligations, with recent litigation trends engaging the Paris Agreement both in direct disputes over its application and as an interpretive tool for other international treaties, such as the European Convention on Human Rights. Indeed, according to Voigt (2023), the normative elements of the ECHR may help shape broader understandings of due diligence and state responsibility under international law in the context of climate change. Wewerinke-Singh & McCoach (2021) illustrate how courts have begun to incorporate international law into their reasoning, using principles drawn from climate treaties and international human rights law to ground and justify their rulings. Such principles have facilitated the progression of reasoning in climate change litigation; however, the relation is not unidirectional. Litigation itself has been used as a mechanism to influence negotiations under the United Nations Framework Convention on Climate Change (UNFCCC), particularly in the area of loss and damage. According to Toussaint (2021), while still in its early stages, this legal strategy has the potential to reinforce the recognition of climate harms and push for more robust international mechanisms for redress.

1.3 Human Rights and Climate Justice

Many climate-related disputes rely on rights-based arguments. Consequently, the narrative surrounding the intersection between human rights and climate change law is evolving. Human rights law, long used as a "gap-filler" in environmental contexts, is now leveraged to frame climate harms as rights violations, offering courts a normative basis for intervention where traditional legal tools fall short (Savaresi & Auz, 2019). While this trend is expanding, it is also contested. The interplay between climate litigation and human rights brings both advantages and disadvantages. On one side, human rights frameworks provide strategic leverage to protect the most vulnerable against climate-related threats to well-being; on the other, human rights law often lacks clear mechanisms for enforcement: many rights are aspirational rather

than legally binding, making it difficult to achieve tangible remedies through courts (Averill, 2009). Moreover, since some human rights litigation cases do not align with climate objectives, the question arises whether this intersection will then relate to the broader societal transformations required for a just transition to net-zero emissions. According to Savaresi & Setzer (2022), the interconnection between these two spheres necessitates further examination from both an academic perspective and a policy and practice standpoint. It is also exemplified by the heterogeneity of judicial outcomes: while some courts have embraced expansive interpretations of rights in climate cases (Yoshida & Setzer, 2020), others have adopted more restrictive approaches (Adelmant et al., 2021). Another facet of rights-based climate litigation is the emphasis placed on intergenerational equity, which emerges especially in youth-led cases. Young people are turning to courts to hold governments accountable for climate inaction, arguing that "states have a responsibility under domestic and international law to protect, respect and fulfil the rights of children against worsening climate change" (Parker et al., 2022). These claims frame children not just as victims, but as litigants, activists, and symbolic figures in climate discourse (Rogers, 2020). Within this debate, not only does the temporal aspect of the climate crisis emerge, but also the territorial one, since the use of strategic human rights-based litigation is not uniform across geographies. Rights-based climate claims are emerging in the Global South, particularly in Latin America, as part of a broader trend of constitutional and environmental litigation. However, while the region has seen several favourable outcomes, Auz (2022) notes that its specific political and economic structures influence both the inclusivity and the long-term potential of such litigation, underscoring the context-specific challenges involved in applying human rights frameworks.

1.4 The Intersection of Law, Policy, and Climate Governance

Climate litigation operates increasingly as a bridge between legal adjudication and broader governance processes. Its role has expanded beyond the courtroom by informing political discourse. This raises concerns about the blurring of the boundaries between the legislative and executive branches of government on a sensitive issue such as climate change. This line of research examines the main areas in which the judiciary is expanding its role. Beauregard et al. (2021) identify litigation as "a policy tool for seeking redress for past and prospective harm resulting from climate change". Peel & Osofsky (2013) investigated the role of climate litigation in climate governance, examining its direct and indirect regulatory functions

in the United States and Australia jurisdictions. In articulating the "governance role" of the judiciary, Kotzé et al. (2024) discuss that courts are no longer merely passive interpreters of the law; rather, they have increasingly been recognised as influential governance actors. Indeed, within the framework of Earth System Law (a paradigm that situates law within the context of Earth's systems, offering a new lens for addressing planetary challenges), courts are defined as "anthropocene institutions" capable of tackling the ecological challenges posed by human activity (Kotzé et al., 2024). Climate litigation intersects with the policy domain also in shaping state accountability for emissions reduction. Such claims can be used to hold countries accountable for the commitments they set out in their Nationally Determined Contributions (NDCs); the present is a central theme in the literature, with the fairness of NDCs being subjected to increasing scrutiny in the context of international environmental law principles, such as equity, precaution, and harm prevention (Rajamani et al., 2021). Beyond regulation, climate litigation has also become a strategic lever for climate justice. Some strategic cases have the potential to inform national and sub-national governments to take more action on climate change; however, according to Beauregard et al. (2021), most of these better serve some types of justice (i.e. intergenerational) than others (i.e. distributive). Indeed, seeking compensation through litigation for climate-related losses faces significant hurdles, as courts encounter difficulties in establishing a causal link between defendants' emissions and plaintiffs' losses, even when supported by scientific evidence (Otto et al., 2022).

1.5 Core Climate Litigation Cases

Despite the argument that all cases of climate litigation contribute to progress in the climate debate, not just those that are strategic or high-profile (Bouwer, 2018; Peel & Osofsky, 2018), the latter tend to receive greater attention in academic literature. The following comprises a selection of landmark cases in climate change litigation and their respective narratives. The themes encompass the role of large corporations, the use of human rights arguments to hold states and companies liable for causing or exacerbating climate change, and the concept of intergenerational equity. A particularly noteworthy legal case that was recently adjudicated is *Lliuya v. RWE* (2015), which marked one of the first attempts to hold a major emitter legally accountable for climate-related harm across borders. The claimant, Saúl Luciano Lliuya, a farmer from Huaraz, argued that RWE's historical emissions had contributed to glacial melt, which had in turn threatened his hometown with catastrophic flooding. He sought damages proportionate to the company's estimated 0.47% share

of global emissions, to cover part of the costs for protective measures (Bertram, 2022). The case was dismissed by the Hamm Regional High Court on 28 May 2025, since it held that the flood risk to Lliuya's property was not sufficiently imminent or concrete. Nevertheless, thanks to this dispute, a significant legal principle was established: large greenhouse gas-emitting companies can be held civilly liable for climate damage, even if this occurs across national borders (Niranjan, 2025).

The most emblematic and discussed case in the climate change litigation narrative is *Urgenda Foundation v. State of the Netherlands* (2015), being part of the "litigation against states" stream, on state responsibility in climate action. In this lawsuit, the court ruled that the Dutch state had a positive obligation to reduce emissions by at least 25% by 2020, affirming that "courts are obliged to assess government actions (including policies) against human rights obligations" (Verschuuren, 2019). In its ruling, the court addressed arguments concerning causality, the precautionary principle, and even climate engineering. This demonstrates that, despite claims of limited national impact, the so-called "drop in the ocean" argument—often invoked by judges to suggest that the contribution of a single actor cannot be considered a direct cause of environmental harm (Peel, 2011)—does not prevent judicial bodies from upholding constitutional and international commitments. However, despite its symbolic and legal significance, the practical implementation of the Urgenda ruling has raised some concerns. In his analysis, Mayer (2023) notes that the measures adopted by the Dutch government in response to the court's mandate seem to have led to a dislocation of emissions rather than their reduction.

KlimaSeniorinnen v Switzerland (2020), a human rights-based lawsuit brought by a group of older Swiss women, is another seminal climate litigation case. Focusing on their vulnerability to extreme heat, the women challenge the Swiss government's inaction on climate change, arguing that the authorities are failing in their duty to protect, as required by the Swiss Constitution and the European Convention on Human Rights (Bähr et al., 2018). Beyond the courtroom, the case exemplifies a dual strategy: while pursuing legal action, the KlimaSeniorinnen actively engaged in public discourse and media mobilisation to foster broader support for ambitious climate policies (Keller & Bornemann, 2021).

The *Massachusetts v. Environmental Protection Agency* (2007) case, which is the first U.S. Supreme Court ruling on climate change, offers a broader reflection on the normative function of litigation itself. The ruling served to clarify the scope of the EPA's authority to regulate greenhouse gas emissions within the context of the Clean Air Act. Using this case as a point of reference, Fisher (2013) identified three overarching narratives that can facilitate comprehension of the scholarly

and legal interest in such cases: (i) litigation as a response to institutional failure, (ii) as a space where legal reasoning holds authority, and (iii) as a forum for the co-production of social facts and norms.

1.6 Climate Litigation as an Emerging Economic Risk

The scope of climate change litigation has recently extended to economic considerations, underscoring its ethical and financial implications. Some authors adopted a governance-oriented strategy to examine how risks associated with these lawsuits translate into corporate duties and, consequently, into new strategic responses. Pearce (2021) and Kaptan (2023) investigate the responsibility of corporate directors under Australian and Swiss law, respectively. According to the authors, recent corporate governance standards require directors to anticipate and manage climate-related legal risks, to avoid potential breaches of fiduciary duty and reputational damage. Milkau (2024) draws attention to the new legal vulnerabilities faced by banks, including the risk of misalignment with EU climate targets and the potential for lawsuits driven by climate activists, which are based on the expanded notion of "duty of care". While the significance of these developments is open to debate, they are likely to become the "new normal" for financial institutions: companies must start recognising climate litigation as a financial risk and adopt innovative approaches to better protect their interests. Some empirical investigations have been conducted to assess whether and how these legal actions affect the value of companies and the behaviour of investors. Dulak & Gnabo (2024) explore the disciplinary impact of climate litigation on firms by assessing the reactions of targeted companies and their industry peers. They examined how companies behaved after announcements of lawsuits and unfavourable court rulings in North America and Europe between 2005 and 2021. Their findings reveal that, overall, market responses are relatively limited. Conversely, Wu & Zhong (2024) identify a substantial decline in stock prices for defendant firms following the filing of climate-related lawsuits in the US between 2010 and 2022. Specifically, they observed a 0.5% decline on the day of filing, with a cumulative unusual decline of 2.7% over the subsequent eight days. A similar phenomenon is reported by Sato et al. (2024), who examined climate litigation against US- and European-listed firms from 2005 to 2021. They document an average stock return decrease of 0.41% following either the initiation of a climate-related lawsuit or an unfavourable court decision. The most pronounced market reactions were observed in cases brought against Carbon Majors. Kolaric (2024), focusing on the court ruling in Milieudefensie et al. v. Royal Dutch Shell (2019), investigated the impact of climate litigation and activism specifically on the stock

prices of major global oil and gas corporations. He found that European and North American oil and gas companies exhibit significantly negative average abnormal returns, reaching up to - 2.14%, but this result does not hold for companies located in other jurisdictions, suggesting that investor may reallocate part of their capital to jurisdictions with a lower risk of climate litigation and activism. However, stock returns are not the only threat; these disputes pose ethical challenges and tangible costs that expand beyond the financial market. Böhm et al. (2022), who connect climate litigations to fundamental issues of corporate ethics, argue that "business is nature, and nature is business". Accordingly, cases against companies such as Milieudefensie et al. v. Royal Dutch Shell (2019) reveal a redefinition of corporate responsibility, compelling firms to recognise and align with these emerging risks, which can result in new potential costs. Solana (2020) develops a taxonomy of the direct and indirect costs that climate litigation can impose on the private sector in general, and on financial institutions in particular. These costs, whether monetary or reputational, evidence how climate change litigation extends beyond the legal realm, representing an emerging economic concern.

2 Theoretical Framework

2.1 Litigation as a Regulatory Mechanism: Insights From Case Studies

Although tort law can be considered inadequate for addressing diffuse and uncertain environmental or health risks (Abelkop, 2013, Schroeder, 2001), it offers specific regulatory advantages. Unlike legislators or executive officials, judges are institutionally required to respond to claims. This specific obligation renders them responsive and, in a sense, generative (Kysar, 2018). Lawsuits are not just seen as private disputes, but as a mechanism through which democratic societies can enforce accountability, promote transparency and uphold the rule of law (Lahav, 2019). The relevance of this line of argumentation is most clearly demonstrated through its application. Prior to an examination of the ongoing debates surrounding climate litigation, it is instructive to consider some precedents in which legal action has helped overcome regulatory inaction, serving as a conduit for public scrutiny and institutional response. The breast implants litigation provides an illustrative example. Lawsuits against implant manufacturers uncovered essential internal documents and testimony that revealed safety risks and corporate concealment, information that had not previously reached the FDA. The agency's regulatory posture was thus

influenced by the litigation-induced transparency, which ultimately led to the implementation of a moratorium on silicone implants in 1992 (Ramello, 2012, Viscusi, 2002). Litigation can also act as a regulatory catalyst by placing new pressures on manufacturers. This was the case of the series of lawsuits brought against the firearms industry. Cities and counties, which lacked direct power to regulate the industry, were "turning to the courts to seek what Congress and most state legislatures have been unwilling to legislate" (Viscusi, 2002). Plaintiffs aimed not only to obtain compensation but also to compel the industry to adopt safety-enhancing design features, such as childproof locks, personalised firing mechanisms, and clearer warnings. According to Lytton (2008), the gun industry case illustrates how tort litigation served a reinforcing role for policy change, offering comparative insights for the climate context. The Tobacco litigation, particularly in the U.S., offers another noteworthy case, illustrating how tort actions can reshape corporate conduct and drive legislative reforms. Over forty years, more than 300 lawsuits were filed against tobacco firms (none lost or settled) until the Minnesota Attorney General compelled the release of millions of internal documents (Giabardo, 2020). These documents had a significant impact on academic, media and policy discourse, contributing to a shift in public perceptions and leading to the implementation of worldwide smoking regulations, including the WHO's Framework Treaty Convention on Tobacco Control (Viscusi, 2002). Kysar (2018) refers to the Tobacco litigation to emphasise the concept of "public life of private law", crediting the Minnesota case's role in exposing tobacco's conspiratorial marketing and fostering global public health reforms. Indeed, state-led tobacco lawsuits employed financial leverage to enforce marketing and advertising restrictions (for example, bans on youth targeting) and to channel settlement funds into anti-smoking campaigns. All these precedents illustrate how, through litigation, traditional rule-making processes have effectively been bypassed. The pressure generated by legal disputes has informed political decision-making and compelled policymakers to undertake necessary regulatory actions. A similar dynamic is now unfolding in the realm of climate change.

2.2 Evidence from Prior Investigations and Hypothesis Development

The regulatory mechanism associated with "marketing and advertising restrictions" observed in Tobacco litigation reemerges in the context of climate change litigation, especially in greenwashing cases. This recent strand targets corporations for making vague or misleading sustainability claims. Such cases parallel the function of tobacco ones by leveraging tort and consumer law to enforce transparency and

constrain corporate messaging. While these analogies help to contextualise climate litigation within a broader regulatory framework, the scope and implications are nuanced. This type of dispute serves multiple purposes. For instance, Giabardo (2020) suggests that climate litigation can operate as a corrective force, holding actors accountable, while enabling public engagement and fostering collective environmental awareness. However, its role extends beyond. As Osofsky (2010) observes, climate lawsuits can reshape governance by introducing cross-scalar regulatory pressures, amplifying bottom-up influences and ensuring that marginalised or smaller-scale actors can contribute to national and global mandates.

To date, two principal contributions have examined the relationship between the legal and political spheres quantitatively, each adopting a different approach. Eskander et al. (2021) analysed global climate governance trends between 1990 and 2019 using the Climate Change Laws of the World database. They focused on patterns in legislation and litigation. Regarding legislation, they observed a significant increase in the number of climate laws, particularly before the Paris Agreement. As for litigation, their analysis focused primarily on outcomes, identifying a geographical divide in judicial responses to climate regulation: courts outside the United States have generally been more supportive, ruling in favour of climate-related arguments in approximately half of the cases, while U.S. courts have historically tended to produce more anti-regulatory outcomes. Kovács et al. (2024) empirically investigated the influence of strategic climate change litigation on public attitudes toward climate policy. To this end, they employed a pre-registered vignette experiment, utilising a representative sample of UK citizens. Notwithstanding the theoretical framework of legal cueing, which suggests that litigation could positively influence policy preferences, the experiment yielded null results: legal cues do not significantly alter climate policy preferences across various measures. Their findings indicate that strategic climate litigation may not directly shift public opinion, but it could still serve as a less controversial advocacy tool for climate activists. In their study, the authors considered a subset of climate litigation cases, specifically those that were designated "strategic", having the potential to direct the attention of citizens and policymakers to social and environmental issues. Our perspective differs: in driving regulatory change, all cases matter, not only those with a high public profile Moreover, unlike Eskander et al. (2021), we excluded US cases from our investigation, and we do not focus on litigation outcomes. Litigation is viewed here as a strategic instrument for exerting pressure, regardless of its verdict. By bringing political debates into the courtroom, actors can shape public discourse, influence regulatory agendas, and generate systemic momentum for change. So, it is the presence of a

climate litigation case, rather than its outcome, that can influence regulatory transformation.
This study adopts a quantitative approach to empirically assess whether the presence of climate litigation correlates with increased stringency in environmental policy frameworks. The central hypothesis is that legal action can play a pivotal role in enhancing regulatory stringency. Litigation is viewed as a mechanism for signalling environmental concerns to policymakers and encouraging the refinement of policy objectives. If this hypothesis is accurate, it should be reflected in measurable increases in the rigour and scope of environmental protection policies.

3 Data & Methods

3.1 Data Sources

For our research purposes, we sought data on the presence and temporal evolution of environmental policies, as well as their effectiveness. Several datasets were considered but ultimately proved unsuitable. For instance, the Environmental Performance Index (EPI) offers cross-country rankings based on aggregated indicators. However, methodological changes across editions render it inappropriate for constructing consistent time series, and it lacks explicit institutional measures. Similarly, while the Sustainable Development Goals Index offers broad coverage and relevant thematic goals (e.g. SDG 13 "Climate Action"), it does not provide specific data on policies or institutional variables. To isolate the transmission channel from litigation to environmental regulation, it is essential to rely on the most objective and rigorous institutional measures. In addition to these limitations in terms of methodology and content, we looked for data with broad temporal and geographical coverage. After a systematic review, the datasets that best satisfied these criteria were the following:

3.1.1 Climate Change Performance Index (CCPI)

The Climate Change Performance Index, CCPI, published by Germanwatch, the NewClimate Institute and the Climate Action Network, was used to provide a de facto measure of policy implementation. The overall index is divided into four categories: GHG Emissions, Renewable Energy, Energy Use and Climate Policy. The Climate Policy category, organised into two sub-categories, National and International, contains the information relevant to this study. Unlike the aggregated index scores, which primarily reflect a country's performance relative to others, the Climate Policy raw data are suitable for longitudinal analysis. The index methodology

was revised in 2017 to place greater emphasis on the Paris Agreement targets; however, this change had no impact on the Climate Policy component. The consistency in this component thus allowed for the use of the entire available timeframe. The data are collected through a survey distributed to climate and energy policy experts working in non-governmental organisations, universities and think tanks. The respondents are asked to rate their country's performance according to six categories: 'GHG Emissions', 'Energy Supply and Renewable Energy', 'Energy Use' 'Future Targets-NDC', 'Fossil Fuel Extraction and Infrastructure' and 'Non-Energy Sectors'. Scores are given from one to five: 1=weak, 2=rather weak, 3=medium, 4=rather strong and 5=strong. Zero is assigned if a specific policy is not in place. As stated in the CCPI 2024 report, the climate policy indicators assess not only national emissions policies and targets but also sectoral policies, targets and their specific implementation; rather than simply measuring the existence or scope of policies, expert assessments offer additional insights into their effectiveness and structural integrity [1] . However, the construction of these data has certain limitations. In particular, their evaluation on a scale introduces the potential for measurement errors, as it incorporates a subjective component into the responses. To minimise bias, the strategy adopted is to try to maintain the consistency of respondents within each country over time.

3.1.2 Environmental Policy Stringency Index (EPS)

The Environmental Policy Stringency Index (EPS) is a measure developed by the Organisation for Economic Co-operation and Development to assess the rigour of environmental policies (OECD, 2022)[2]. This study uses the latest version, the EPS21, which was last updated in September 2024 and consists of three equally weighted sub-indices: market-based instruments, non-market-based instruments, and technology-support policies. The market-based instruments sub-index is made up of six policies that impose a price on pollution. Some examples include the stringency of CO_2 trading schemes, measured by the average annual permit price, and Renewable Energy Trading Schemes, which require a mandated percentage of electricity from renewable sources- the higher the percentage, the stricter the policy. The non-market-based instruments sub-index includes four policies that establish emission limits and standards. An example is the Nitrogen Oxide Emission

[1] Further details on the database can be found on the official Climate Change Performance Index (CCPI) website: https://ccpi.org/ The 2024 mentioned report can be downloved and consulted via the link https://ccpi.org/download/climate-change-performance-index-2024/

[2] See also the OECD webpage *A Tool to Evaluate the Effectiveness of Environmental Policy* https://www.oecd.org/en/topics/sub-issues/economic-policies-to-foster-green-growth/how-stringent-are-environmental-policies.html

Limit Value, which sets the maximum allowable concentration of NOx emissions from newly built coal-fired power plants. A lower limit indicates a more stringent policy. The technology-support policies sub-index includes three policies that promote innovation and adoption of clean technologies; these are further categorised into upstream measures, like public R&D funding for emerging technologies, and downstream measures, such as renewable energy support policies that incentivise technology adoption. One of the limitations of this index is that it only accounts for policies aimed at mitigating climate change and air pollution, not capturing regulations across all sectors of the economy. It is constructed by first selecting policies and scoring their stringency on a scale of zero (no policy in place) to six, and subsequently aggregating the scores into an index. Each of the sub-indexes described can serve as an independent indicator, as the combined policy weights within them sum to one. Although its components could be analysed separately, this study uses the index in its aggregated form.

3.1.3 Climate Action and Policy Measurement Framework (CAPMF)

The CAPMF is a policy database that covers 130 policy variables grouped into 56 policies. It has been developed under the OECD International Programme for Action on Climate, a program that supports countries in enhancing their climate action (Nachtigall et al., 2024, OECD, 2022). The database encompasses policies that are designed to foster climate change mitigation, as well as policies that positively impact the climate, despite not explicitly targeting this objective. The data are organised across three building blocks: sectoral policies, cross-sectoral policies, and international policies. The policies of the former block can be narrowed to a specific source or economic sector (namely electricity, transport, buildings and industry); for each sector, the distinction between market and non-market-based instruments is applied, as previously discussed in the EPS index. The cross-sectoral block comprises policies and actions whose scopes encompass more than one specific emission source or sector (e.g. emission targets), while the international one refers to policy commitments associated with international agreements. Methodologically, each block contains several modules that encompass different climate actions and policies; one policy instrument can consist of several policy variables. The modular structure of the index allows for separate analysis of the three blocks, which was used to empirically investigate whether the correlation with the presence of climate litigation varies depending on the different nature of policies analysed in each. This measure is labelled a de jure, since the CAPFM considers governments' policies at face value, without accounting for their enforcement. The policy stringency of each

sub-index (Sectoral, Cross-Sectoral, International) ranges from 0 (no policy in place) to 10. Table 1 reports some of the key information from the described databases. Note that not all available data have been used in the empirical analysis, since the selected time period is 1990-2023, and only countries with information available for at least one of these indices have been included in the sample.

Table 1: Summary of Environmental Policy Data Characteristics and Coverage

Database	**Description**	**Time-Frame and Countries**	**Type**
EPS	13 policy instruments grouped into three sub-indices. It ranges 0–6	1990–2020 40 countries	De-Jure
CCPI	National and International component, each ranging 0–5	2007–2024 63 countries + EU	De-Facto
CAPMF	130 policy variables, grouped into 56 policy instruments and other climate actions. It ranges 0–10	1990–2022 50 countries + EU27 as a block	De-Jure

3.1.4 Climate Change Litigation Data

Of the two databases provided by the Sabin Centre for Climate Change Law and Columbia Law School, the one used in this study is Global Climate Change Litigation, which encompasses all cases except those in the U.S. It covers cases from 55 countries; to be included in the database, cases must (i) have been brought before a judicial body; (ii) be litigation in which climate change law, policy or science is a material issue of fact, rather than a case that makes only passing reference to climate change without properly addressing it. The database also covers some investor–state dispute settlement (ISDS) cases brought before arbitral tribunals under bilateral and multilateral investment treaties. However, such are included only if they relate directly to the adoption or withdrawal of a domestic measure explicitly aimed at meeting a country's climate change targets [3]. Litigations that may have a direct impact on climate change but do not explicitly raise climate issues are not considered. The data coverage is subject to some limitations, including language barriers, media exposure and the public availability of court documents; this results in better reporting of litigation in some jurisdictions than others. Furthermore, the definition of climate litigation may be broader than the one used

[3]Further details of the database's coverage and its inclusion criteria are available on the official website: https://climatecasechart.com/

to determine whether a particular case should or should not be in this database: climate change cuts across a wide range of laws and policies, so some relevant litigation that does not meet the formal inclusion criteria may be missing from this analysis. The data employed in this study were retrieved on 15 November 2024 from https://climatecasechart.com/.

3.2 Descriptive Statistics

The descriptive statistics in Table 2 present detailed information on the variables discussed so far. For the *de facto* variables (CAPMF and EPS), the within variability exceeds the between, indicating that the stringency of environmental policies has fluctuated over time within each country more than from one country to another. The *de jure* variables (CCPI) show less within-country variation, suggesting that, while the stringency of environmental policies has evolved, their formal enforcement has remained relatively stable.

Table 2: Variability of Indices Measuring the Stringency and Enforcement of Environmental Policies

Variable	*Mean*	*Std. dev.*	*Min*	*Max*	*Observations*
CAPMF Sectoral					
overall	1.590 653	1.411 235	0	5.604 939	N = 1617
between		0.568 901	0.378 226 7	2.565 657	n = 49
within		1.293 969	−0.873 244 9	4.629 935	T = 33
CAPMF Cross-Sectoral					
overall	1.131 771	1.532 126	0	7.555 555	N = 1617
between		0.702 004	0.079 685 7	2.570 146	n = 49
within		1.365 418	−0.923 223 2	6.388 786	T = 33
CAPMF International					
overall	2.607 129	1.860 854	0	8.818 182	N = 1617
between		0.492 718	1.512 397	3.348 485	n = 49
within		1.795 577	−0.505 818 8	8.232 473	T = 33
EPS Index					
overall	1.779 839	1.192 687	0	4.888 889	N = 1240
between		0.783 205	0.331 541 2	2.863 799	n = 40
within		0.907 695	−0.478 225 8	3.868 548	T = 31
CCPI National					
overall	2.381 598	0.573 834 3	1	4.121 212	N = 968
between		0.375 699	1.582 647	3.364 209	n = 61
within		0.432 111 9	0.804 433 9	3.838 097	T-bar = 15.8689
CCPI International					
overall	2.686 05	0.828 312	0.892 857 1	5	N = 968
between		0.585 119	1.470 588	3.909 216	n = 61
within		0.586 453 8	0.938 749 9	4.665 559	T-bar = 15.8689

Figure 1 displays the trends of the de jure indices, with the data normalised to account for differences in scale. All indices exhibit an upward trend, with a more pronounced increase after 2000 and an even steeper rise after 2015, presumably to adapt to the ambitious targets discussed during the Paris Agreement.

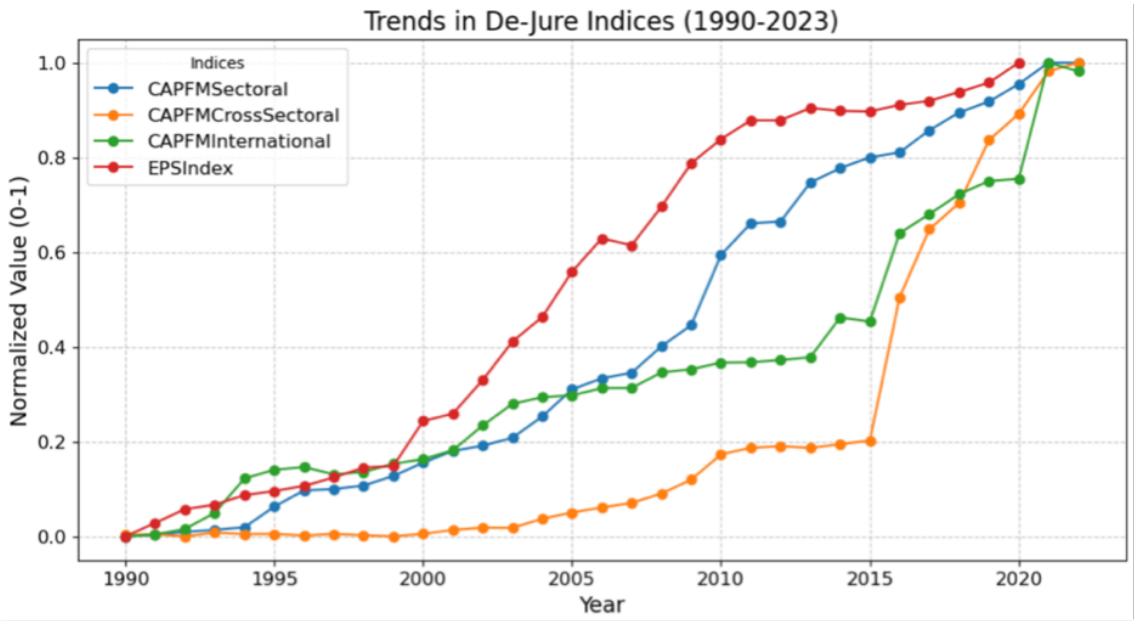

Figure 1: Trends in the *de-jure* indices (1990–2023)

Figure 2 plots the indices separately, splitting the sample into two groups based on the median GDP value. This allows us to explore potential differences in policy stringency between high- and low-income countries. The temporal trajectories suggest that the stringency of environmental policies is not necessarily related to a country's level of wealth. The EPS index (in red) is the only measure that exhibits a slight difference between the two groups.

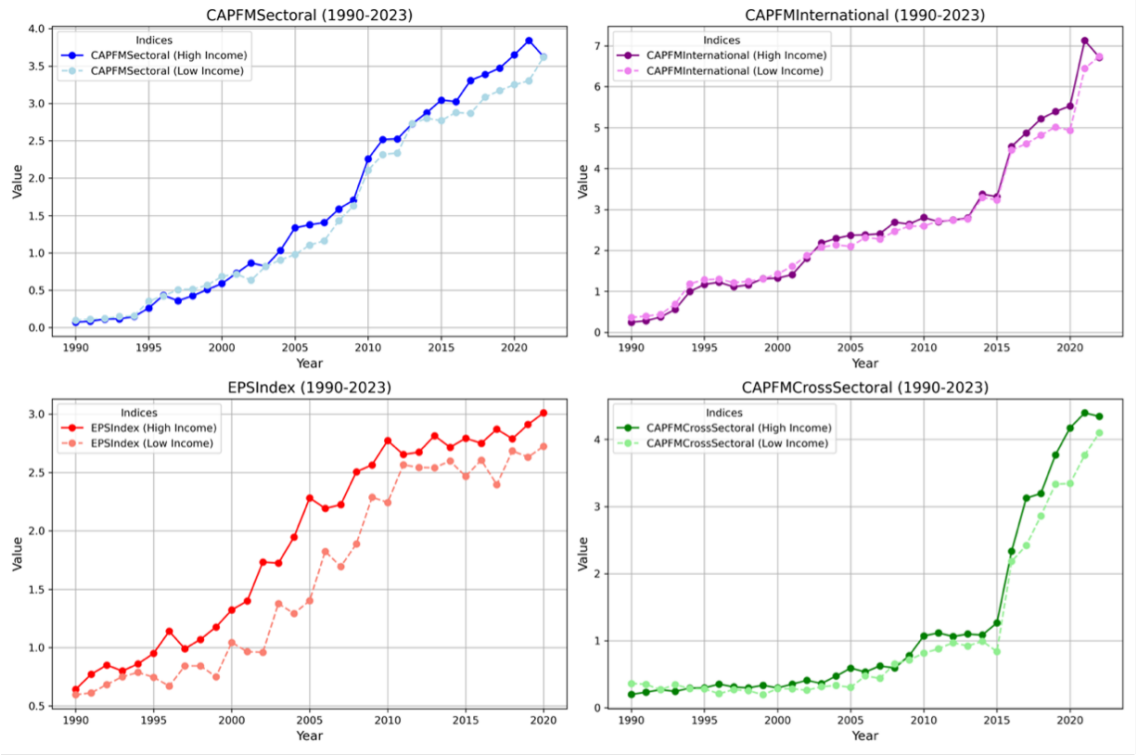

Figure 2: Trends of the *de-jure* indices for high and low-income groups (1990-2023)

Figures 3 and 4 present the evolution of the *de facto* indices; in this case, there is no specific pattern, but the average difference between the two country groups (high and low income) is more pronounced.

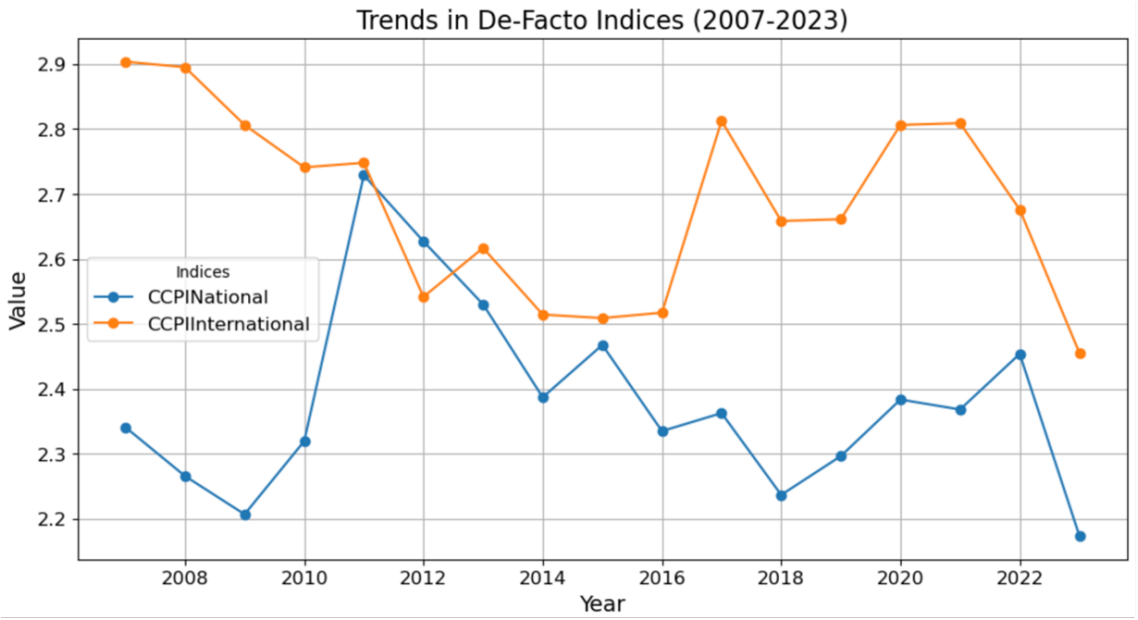

Figure 3: Average trends of the *de-facto* indices

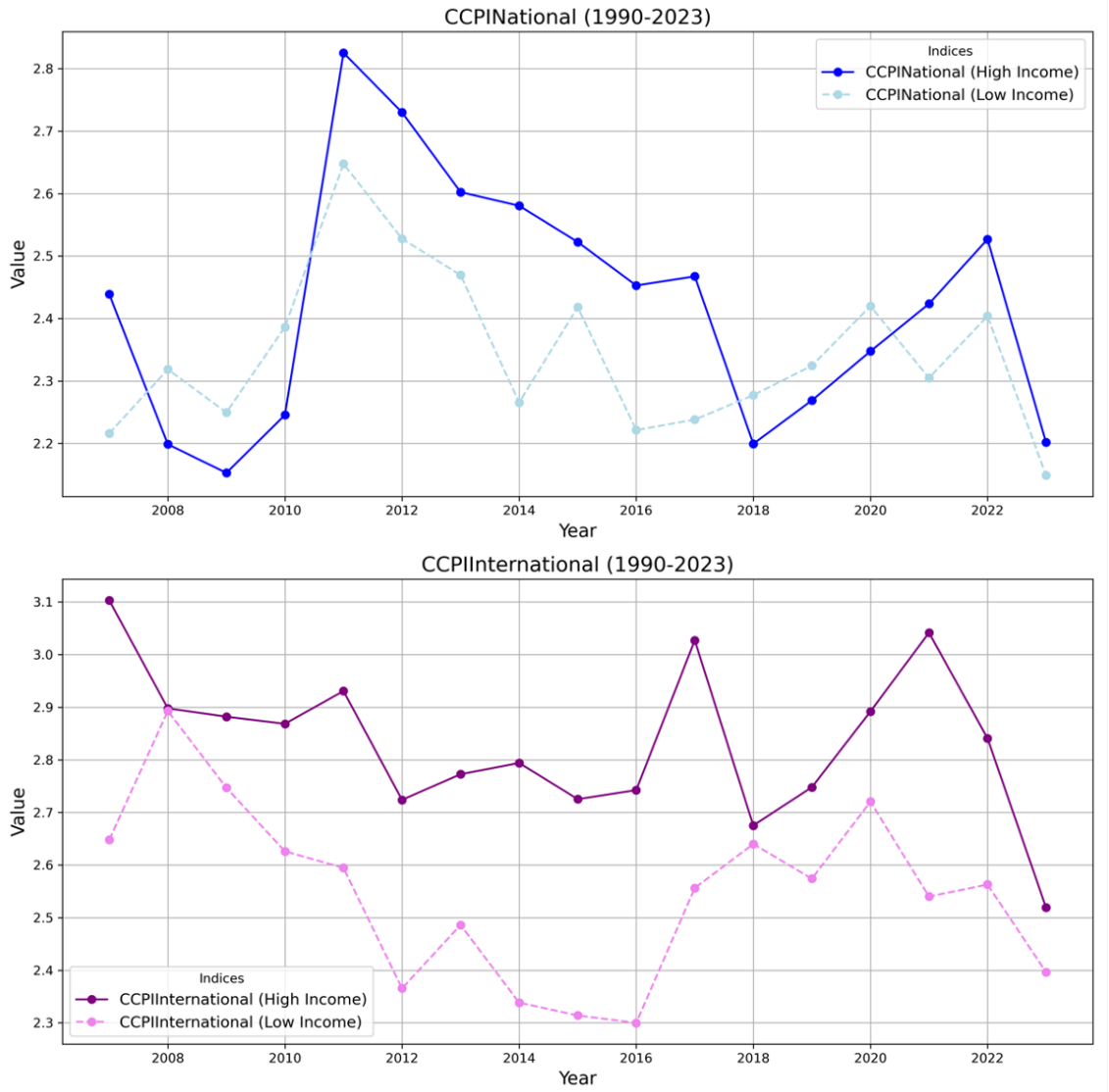

Figure 4: Average trends of the *de-facto* indices for high and low-income groups

Table 3 presents climate litigation data, indicating the countries and the number of cases within the analysed period (1990–2023). The countries considered are only those for which data on *de facto* or *de jure* environmental stringency measures were available. The US was excluded by assumption. Among these, some experienced no more than one litigation case per year. It is the case of Czechia, Norway, Peru, Sweden, Turkiye, and Ukraine. In some countries, whenever litigation occurred in a given year, it was never limited to one case; Argentina and Denmark exemplify this. The remaining countries exhibit a mixed pattern, showing no consistent tendency towards either low or high litigation frequency.

Table 3: Table 3: Total Number of Litigations (1990–2023)

Country	**Litigations**	**Country**	**Litigations**
Australia	133	Austria	6
United Kingdom	124	Ireland	6
Brazil	91	Estonia	5
Germany	56	Japan	4
Canada	38	China	4
France	29	Romania	3
New Zealand	29	Türkiye	3
Mexico	22	Czechia	3
Spain	16	Norway	2
Colombia	16	Sweden	2
Indonesia	15	Denmark	2
Argentina	13	Ukraine	2
India	13	Peru	2
Netherlands	11	Hungary	1
Korea, Rep.	10	Finland	1
South Africa	9	Luxembourg	1
Chile	9	Russian Fed.	1
Poland	8	Thailand	1
Italy	7	Portugal	1
Switzerland	6	Bulgaria	1
Belgium	6		

Figure 5 illustrates the evolution of the environmental stringency index for the ten countries with the highest number of litigation cases. As shown in the figure, some data are available only for specific *de jure* measures. For example, Colombia, which scores lowest in the CAPFM Sectoral, Cross-Sectoral, and International measures, does not appear in the EPS graph. Conversely, Brazil is represented solely in the EPS one. Data for Colombia in the CCPI became available in 2022; consequently, only two observations are reported for it. Similar trends are generally observed among

the countries. Mexico and Colombia tend to perform slightly worse than others regarding *de jure* measures, especially in the CAPFM Sectoral and International dimensions. The United Kingdom, France, and Germany often rank as the best performers. This variation in trends is more apparent in the EPS index graph, where Brazil, New Zealand, and Mexico show little progress. Brazil even displays declining trends from 2002 to 2010. Due to their significant fluctuations over time, it is difficult to identify a clear pattern in the *de facto* measures.

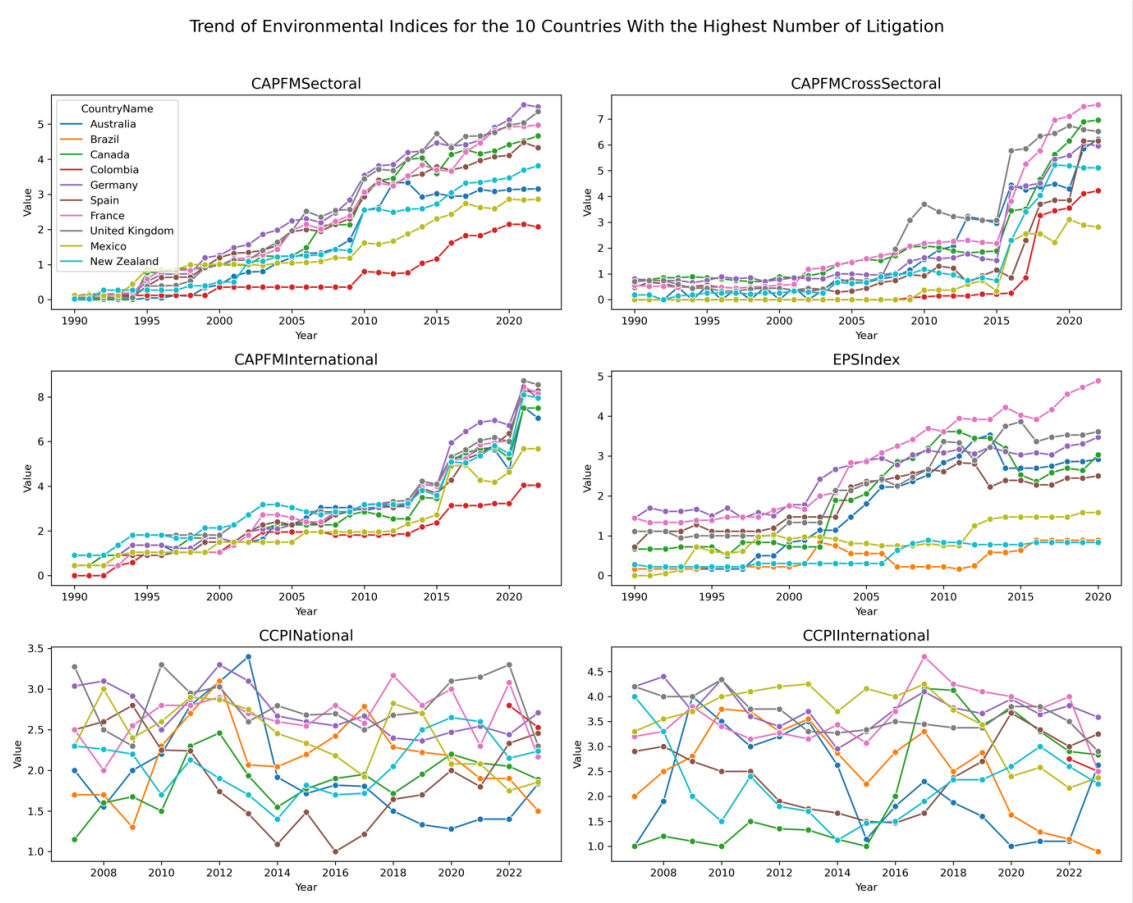

Figure 5: Trends for environmental indices of the 10 countries with the highest number of climate litigations

Figure 6 presents data on the stringency of environmental policies in G7 countries. As can be observed, their trends do not differ substantially from the overall patterns shown in Figures 1 to 4. Similar patterns emerge across the CAPFM indices, except in the cross-sectoral block in the top right-hand corner of the figure, where the UK's slope is steeper. In the evolution of the EPS Index, G7 countries show quite differing trajectories; however, given that this index is used in its aggregate form, it is not visible which of its three underlying components (or none specifically) is contributing to this variation. Considerable fluctuation is observed in the de facto data, namely

the CCPI National and International, making it difficult to discern a clear pattern. Considering both the *de facto* and *de jure* components, Germany, France, and the United Kingdom maintain the most consistent improvements in climate regulation over time. These countries also rank among those with the highest number of climate litigation cases, as reported in Table 3.

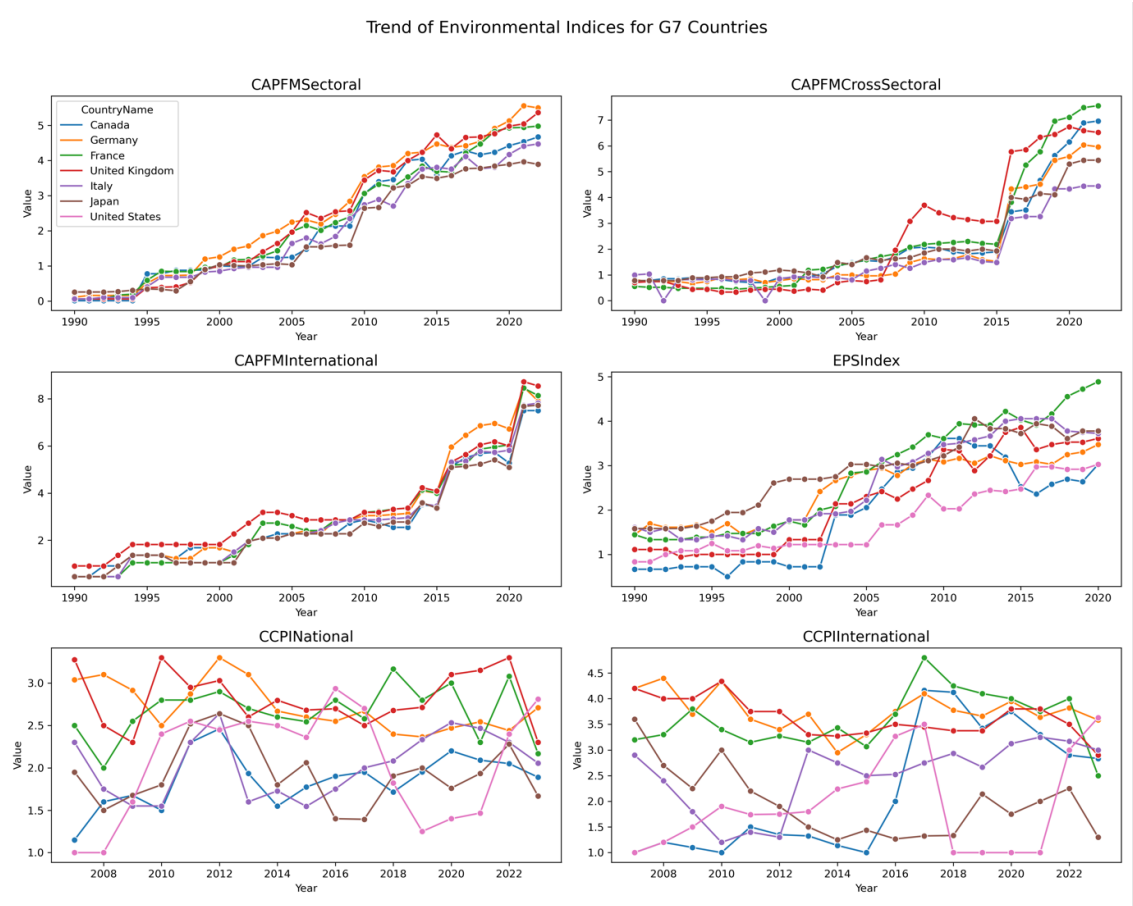

Figure 6: Trends of the environmental indices of the G7 countries

Table 4 presents for each country the number of years in which litigation occurred. For instance, over the 33 years analysed, the United Kingdom experienced litigation in 23 different years. However, in several of those years, litigation happened more than once. This is reflected in Table 3, which reports a total of 124 cases in the UK.

Table 4: Number of Years in Which Litigation Occurred (1990–2023)

Country	**Years**	**Country**	**Years**
United Kingdom	23	Italy	4
Australia	22	Belgium	4
New Zealand	15	Estonia	4
Brazil	14	Switzerland	4
Canada	14	Korea, Rep.	4
Germany	10	Poland	4
France	9	South Africa	3
Colombia	9	Japan	3
Indonesia	8	Türkiye	3
India	6	China	3
Spain	6	Czechia	3
Chile	6	Romania	2
Mexico	6	Norway	2
Ireland	5	Sweden	2
Netherlands	5	Ukraine	2
Argentina	5	Peru	2
Austria	5		

In Figure 7, the CAPFM index has been used to visually denote the most performant countries in terms of policy stringency over the period analysed. To do so, the three components of the index, namely the Sectoral, Cross-Sectoral and International, have been aggregated by giving equal weight to each. However, the map in Figure 7 does not provide a comprehensive representation of all the countries included in the analysis: this is because data for certain countries, such as Brazil, are not available for this particular stringency measure, although they are available for others, either *de facto* or *de jure*. Instead, Figure 8 shows all countries, included in the sample, that have experienced climate litigation during the period 1990-2023. These results are consistent with those presented in Table 3.

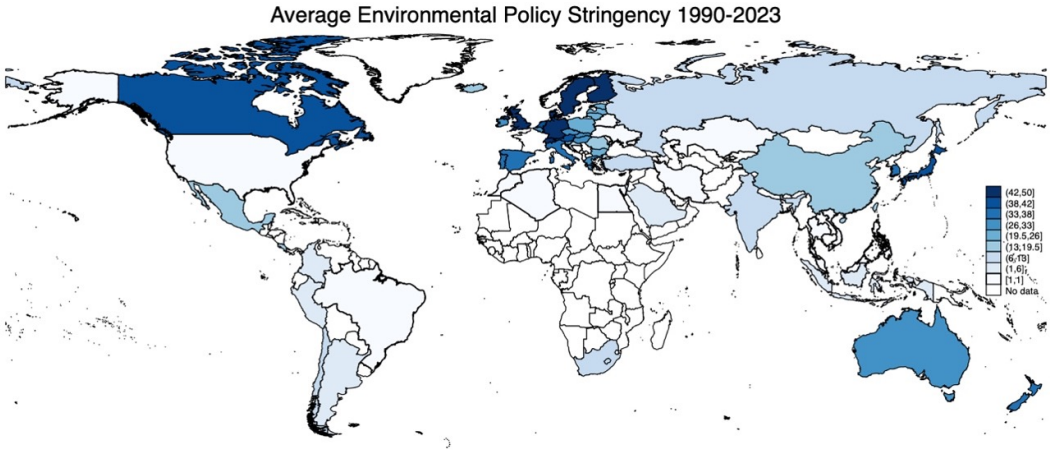

Figure 7: CAPMF Average Value (1990-2023)

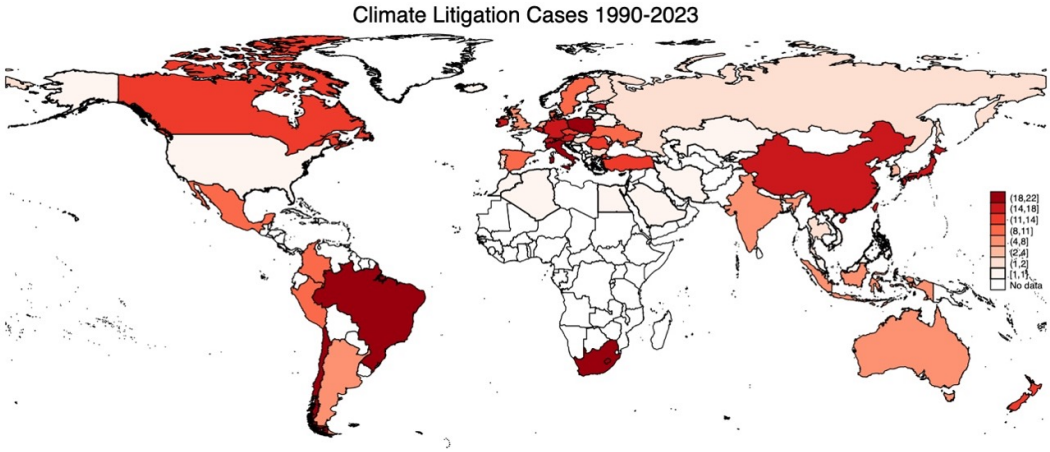

Figure 8: Number of Climate Litigation Cases (1990-2023)

3.3 Empirical Strategy

3.3.1 Control Variables and Correlation Matrix

Previous studies provide a rationale for our choice of control variables. Frohm et al. (2023), using the EPS index measure, finds that more stringent environmental policies are associated with lower emissions, while Hassan & Romilly (2018) discussed that environmental performance, measured through greenhouse gas emissions, "plays a crucial role in the formulation of business strategy at the firm level and government environmental policy at national and international levels". Employing the CAPFM database, Nachtigall et al. (2024) use the Rule of Law indicator to account for policy enforcement and saliency. Accordingly, we include analogous control variables in our analysis: GDP per capita (based on Purchasing Power Parity) and Rule of Law data, sourced from the World Bank Group

https://data.worldbank.org/, together with greenhouse gas (GHG) emissions data from Our World in Data https://ourworldindata.org/. These variables capture economic and environmental determinants that are likely to influence the evolution of environmental policy stringency and enforcement over time.

As shown in the correlation matrix of Table 5, environmental policy measures, both *de facto* and *de jure*, generally do not correlate with GDP PPP, except for a slight positive correlation with the EPS Index and the CCPI International. This indicates that the strictness of regulations is not necessarily linked to a country's economic development level, something already intuited by observing the patterns in Figure 2. There is a negative relationship between GHG emissions and GDP PPP, as well as the Rule of Law. This can be interpreted as indicative of the technological and regulatory capacity of countries with higher levels of income to reduce emissions more effectively. GHG emissions are also negatively correlated with the environmental performance indices, both *de facto* and *de jure*, implying that lower emissions tend to be associated with more stringent regulation, and vice versa. The Rule of Law is positively and significantly associated with all the environmental performance indices. This is intuitive, as countries with a strong rule of law typically enforce policies effectively, including those related to environmental protection. Overall, the environmental indices display a strong positive correlation with each other, since they all measure similar aspects, though in slightly different ways (for instance, some focus more on sectoral policies, while others on international ones). Climate litigation, defined as a dummy variable that equals one when a case occurs in a specific country in a given year, and zero otherwise, shows a high positive correlation with *de jure* indices, GHG emissions, and the Rule of Law, but is not statistically correlated with the *de facto* indices. The Number of Cases variable, which counts climate litigations in a given country in a given year, tends to correlate with the other variables similarly to Climate Litigation.

Table 5: Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Log GDP PPP	1.000										
(2) Log GHG emissions	-0.047	1.000									
	(0.040)										
(3) Rule of Law	-0.005	-0.333	1.000								
	(0.850)	(0.000)									
(4) CAPMF Sectoral	0.011	0.017	0.358	1.000							
	(0.658)	(0.492)	(0.000)								
(5) CAPMF Cross Sectoral	-0.002	0.014	0.345	0.790	1.000						
	(0.925)	(0.565)	(0.000)	(0.000)							
(6) CAPMF International	0.003	-0.097	0.229	0.863	0.829	1.000					
	(0.896)	(0.000)	(0.000)	(0.000)	(0.000)						
(7) EPS Index	0.096	-0.111	0.415	0.818	0.665	0.704	1.000				
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)					
(8) CCPI National	0.018	-0.062	0.096	0.129	0.090	-0.023	0.096	1.000			
	(0.571)	(0.058)	(0.003)	(0.001)	(0.017)	(0.537)	(0.028)				
(9) CCPI International	0.079	-0.068	0.240	0.135	0.222	0.086	0.058	0.563	1.000		
	(0.014)	(0.036)	(0.000)	(0.000)	(0.000)	(0.024)	(0.181)	(0.000)			
(10) Climate Litigation	0.024	0.182	0.114	0.398	0.451	0.407	0.190	-0.077	0.067	1.000	
	(0.299)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.016)	(0.037)		
(11) Number of Cases	-0.020	0.153	0.082	0.288	0.349	0.297	0.125	-0.041	0.038	0.594	1.000
	(0.382)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.206)	(0.236)	(0.000)	

3.3.2 Different Model Specifications

To test the association between the presence of climate litigation cases and the stringency of environmental policies, a set of progressively richer econometric models is estimated. Across all specifications, the same set of control variables is included: (i) the logarithm of GDP per capita in PPP terms, (ii) the logarithm of GHG emissions, and (iii) the World Bank Rule of Law Index. Standard errors are always clustered at the country level to account for serial correlation within countries. The generic baseline model presented in Tables 6 and 7 can be written as:

$$Y_{it} = \alpha + \beta X_{it} + Z'_{it}\gamma + \varepsilon_{it} \tag{1}$$

where Y_{it} is the measure of policy stringency for a country i in a year t, X_{it} is the main variable of interest (climate litigation), and Z'_{it} is the set of controls. ε_{it} is the clustered robust error calculated at the country level. Y_{it} could be either a *de facto* or *de jure* measure. In Table 6, the key independent variable X_{it} is a dummy equal to one if at least one case of climate litigation occurred in country i in year t, while in Table 7 X_{it} is a discrete variable that counts the number of litigation cases observed in a given country and year. In both cases, the estimated model corresponds to the pooled OLS baseline above, but the interpretation of β changes. In Table 6, β captures the average difference in policy stringency associated with the occurrence of a climate litigation case, while in Table 7 it measures the marginal association

with an additional case of litigation. To account for time-invariant unobserved heterogeneity across countries, in Table 8 we estimate a panel model with country fixed effects:

$$Y_{it} = \alpha + \beta X_{it} + Z'_{it}\gamma + \mu_i + \varepsilon_{it} \tag{2}$$

where μ_i captures unobserved, country-specific characteristics that are constant over time (Wooldridge, 2010). This specification ensures that identification comes from within-country variation over time. In Table 9, we further introduce year fixed effects to control for global shocks or trends that are common across all countries:

$$Y_{it} = \alpha + \beta X_{it} + Z'_{it}\gamma + \delta_t + \mu_i + \varepsilon_{it} \tag{3}$$

where δ_t absorbs time-specific unobservables such as international agreements, global economic crises, or technological changes. To account for the delayed effects of litigation on policy, in Tables 10 and 11 the main explanatory variable is lagged by one year:

$$Y_{it} = \alpha + \beta X_{i,t-1} + Z'_{it}\gamma + \delta_t + \mu_i + \varepsilon_{it} \tag{4}$$

In Table 10 we estimate the full sample, while in Table 11 the model is estimated on the restricted sample of common law countries to explore potential heterogeneity by legal system. Across all specifications, the coefficient β measures the association between climate litigation and environmental policy stringency, conditional on controls and fixed effects. Its interpretation depends on the coding of X_{it}. In the binary case, which is the most used in our analysis, β represents the difference in average policy stringency between countries that experienced litigation in a certain year and those which did not. In the count case, β reflects the marginal effect of an additional litigation case. Moreover, in lagged models, β measures the delayed association, mitigating concerns of simultaneity bias.

3.3.3 Results

Before estimating the model, we assessed the presence of multicollinearity by computing the variance inflation factors (VIFs) for all covariates. The test indicates that multicollinearity is not a concern, as the maximum VIF is 1.24 (for GHG emissions) and the average VIF is 1.14. Tables 6 and 7 present the results of ordinary least squares (OLS) regressions. The aim is to provide an initial assessment of the relationship between the presence and frequency of climate litigation and policy stringency, before turning to the panel data specifications in Tables 8–11. As shown in Table 6, the relationship between the presence of environmental litigation and

the stringency of regulation is positive and statistically highly significant for all the four the *de jure* measures (columns 1 to 4). Considering the overall variation of the indices (reported in Table 2), the presence of climate litigation is associated with an increase in the CAPFM Sectoral index by 0.880 overall standard deviations (1.243/1.411). Applying the same logic, the results show that the presence of climate litigation is associated with an increase of 1.16 overall standard deviations in the CAPFM Cross-Sectoral index, 1.113 overall standard deviations in the CAPFM International index, and 0.295 overall standard deviations in the EPS Index. However, the presence of climate litigation, when considering the *de facto* indices (CCPI National and International), which are measures that assess the actual enforcement of laws, does not show a statistically significant relationship. The findings indicate a correlation between climate disputes and stricter regulation; however, this association does not appear to be reflected in observable changes in law enforcement.

Table 6

	De Jure Measures				*De Facto Measures*	
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Sectoral	Cross-Sectoral	International	EPS	National	International
Climate Litigation	1.243***	1.783***	2.071***	0.352*	-0.122	0.0616
	(0.157)	(0.194)	(0.187)	(0.202)	(0.0868)	(0.140)
Log GDP PPP	0.0130	0.0182	-0.00566	0.119	0.0111	0.0594
	(0.0550)	(0.0512)	(0.0700)	(0.0762)	(0.0245)	(0.0407)
Log GHG	0.0540	0.0344	-0.185***	0.0356	-0.0000716	0.00864
	(0.0495)	(0.0423)	(0.0409)	(0.0892)	(0.0395)	(0.0532)
Rule of Law	0.544***	0.587***	0.248**	0.616***	0.0653	0.211**
	(0.0906)	(0.0876)	(0.0923)	(0.125)	(0.0527)	(0.0923)
Constant	-0.213	-0.736	6.215**	-3.583	1.961	0.255
	(2.318)	(2.174)	(2.573)	(4.036)	(1.195)	(1.655)
Observations	1,296	1,296	1,296	975	945	945
R-squared	0.242	0.275	0.204	0.198	0.017	0.064

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In Table 7 we analyse the relationship between the stringency of environmental policies and the number of climate litigation cases. This analysis captures not only the presence of a climate case but also the magnitude of the phenomenon in terms of the number of climate lawsuits that occurred in a country in a specific year. What emerges is that, while the relationship remains consistent, it is the presence of climate litigation, rather than its numerosity, that has the greatest correlation with environmental regulation. Indeed, the presence of one additional climate litigation case is associated with an increase of the CAPFM Sectoral index by 0.129 overall

standard deviations, which is notably smaller than the estimates reported in Table 6. The presence of climate litigation is associated with an increase of 0.191 overall standard deviations in the CAPFM Cross-Sectoral index and 0.176 overall standard deviations in the CAPFM International index. In this specification, the EPS Index loses statistical significance. As in the previous analysis, no significant correlation is found between the number of climate litigation cases and the *de facto* indices.

Table 7

	De Jure Measures				*De Facto Measures*	
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Sectoral	Cross-Sectoral	International	EPS	National	International
Number of Cases	0.183**	0.293***	0.329***	0.0496	-0.00957	0.00459
	(0.0779)	(0.106)	(0.102)	(0.0307)	(0.0140)	(0.0234)
Log GDP PPP	0.0270	0.0422	0.0206	0.124	0.00951	0.0602
	(0.0588)	(0.0564)	(0.0744)	(0.0765)	(0.0246)	(0.0406)
Log GHG	0.0857*	0.0726*	-0.137***	0.0454	-0.00620	0.0118
	(0.0444)	(0.0379)	(0.0352)	(0.0886)	(0.0393)	(0.0527)
Rule of Law	0.587***	0.637***	0.310***	0.632***	0.0552	0.216**
	(0.0766)	(0.0757)	(0.0734)	(0.126)	(0.0534)	(0.0927)
Constant	-1.238	-2.209	4.504*	-3.909	2.124*	0.172
	(2.394)	(2.243)	(2.678)	(3.980)	(1.179)	(1.615)
Observations	1,296	1,296	1,296	975	945	945
R-squared	0.191	0.215	0.132	0.193	0.012	0.064

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Based on these preliminary estimates, we find that the presence of a climate litigation case, rather than its frequency, exhibits a stronger correlation with the evolution of environmental policy stringency. Consequently, from this point onwards, the main variable of interest will be X_{it} coded as a dummy variable to indicate the presence of climate litigation, as previously described.

Tables 8 through 11 report the results of panel data regressions using fixed effects to control for unobserved heterogeneity across countries. All models account for within-country correlation over time by clustering standard errors at the country level. The specification in Table 8 captures potential simultaneity in the relationship between climate litigation and policy stringency; however, it may fail to account for delayed effects, as litigation could influence regulatory outcomes with a time lag. Tables 9, 10, and 11 extend the model by including year fixed effects, thereby controlling for time-specific characteristics common across countries. In addition, Tables 10 and 11 introduce a one-year lag of the climate litigation variable to account for potential temporal delays in the policy response.

In Table 8 all the *de jure* indices are highly statistically significant. In particular, the presence of climate litigation is associated with an increase of 1.271 within-country standard deviations in the CAPFM Sectoral index (calculated as 1.644/1.293). This effect is substantially larger in magnitude than any of the results reported previously. Applying the same logic, the results indicate that climate litigation is associated with an increase of 1.465 within standard deviations in the CAPFM Cross-Sectoral index, 1.331 in the CAPFM International index, and 0.973 in the EPS Index. As in all previous analyses, no significant correlation is found between the number of climate litigation cases and the *de facto* indices.

Table 8

	De Jure Measures				*De Facto Measures*	
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Sectoral	CrossSectoral	International	EPS	National	International
Climate Litigation	1.644***	2.001***	2.390***	0.883***	-0.0375	0.0332
	(0.121)	(0.166)	(0.173)	(0.124)	(0.0584)	(0.0766)
Log GDP PPP	-0.0195	-0.0278	-0.0342	0.0153	0.00184	-0.0110
	(0.0573)	(0.0601)	(0.0790)	(0.0544)	(0.0177)	(0.0255)
Log GHG	-0.820	-1.904**	-1.708*	-0.126	0.0103	0.0798
	(0.792)	(0.736)	(0.991)	(0.776)	(0.195)	(0.286)
Rule of Law	0.594	0.0768	0.438	0.0934	0.372**	0.352
	(0.714)	(0.632)	(1.032)	(0.695)	(0.163)	(0.317)
Constant	17.26	37.69***	35.62*	3.676	1.870	1.303
	(14.94)	(13.80)	(18.81)	(14.88)	(3.846)	(5.392)
Observations	1,296	1,296	1,296	975	945	945
R-squared	0.193	0.238	0.213	0.110	0.014	0.007
Number of Countries	48	48	48	39	59	59

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The model presented in Table 9 shows that, after controlling for year-fixed effects, the correlation between climate litigation and regulation remains statistically significant only for the *de jure* CAPFM sectoral measure. Particularly, it is associated with an increase in the index by 0.114 within standard deviations.

Table 9

	De Jure Measures				*De Facto Measures*	
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Sectoral	CrossSectoral	International	EPS	National	International
Climate Litigation	0.148**	0.190	-0.00116	0.0461	-0.00232	0.0483
	(0.0733)	(0.117)	(0.0864)	(0.0902)	(0.0550)	(0.0686)
Log GDP PPP	-0.00273	-0.0136	-0.00378	-0.0364	-0.00168	-0.0160
	(0.0201)	(0.0267)	(0.0233)	(0.0221)	(0.0159)	(0.0241)
Log GHG	-0.665***	-1.195***	-1.120***	-0.0240	-0.102	-0.0267
	(0.233)	(0.344)	(0.284)	(0.296)	(0.202)	(0.288)
Rule of Law	0.0286	0.0123	0.176	0.259	0.402**	0.437
	(0.178)	(0.289)	(0.221)	(0.277)	(0.162)	(0.301)
Constant	12.96***	23.18***	22.26***	2.338	4.074	3.690
	(4.388)	(6.341)	(5.460)	(5.639)	(3.941)	(5.448)
Observations	1,296	1,296	1,296	975	945	945
R-squared	0.907	0.855	0.931	0.766	0.114	0.070
Number of Countries	48	48	48	39	59	59

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
All regressions include year-fixed effects

Tables 10 and 11 introduce a one-year lag of the climate litigation variable. Comparing these results with those reported in Table 9 shows that accounting for delayed effects slightly increases the magnitude of the relationship. In the specification of Table 10, the presence of climate litigation is associated with a 0.129 within-country standard deviation increase in the CAPFM Sectoral index.

In Table 11, the sample is divided between civil law and common law countries. The model specification is the same as in Table 10, and although not displayed in the table, all regressions include the full set of control variables. The results reveal that the observed effect is driven almost entirely by common law countries. In these countries, the presence of climate litigation shows a strong and statistically significant association with increased policy stringency. This is particularly relevant given that common law countries represent only a small fraction of the sample, just 12 countries in total. Despite their limited number, they appear to account for the entire observed effect, while no comparable relationship is detected in civil law countries. This suggests that the influence of climate litigation on environmental regulation is much more pronounced in legal systems where litigation plays a central role in shaping policy outcomes.

Table 10

	De Jure Measures				*De Facto Measures*	
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Sectoral	CrossSectoral	International	EPS	National	International
L.Climate Litigation	0.167**	0.182	-0.0222	0.00740	-0.0201	-0.00985
	(0.0702)	(0.136)	(0.0864)	(0.0998)	(0.0520)	(0.0746)
Log GDP PPP	0.000337	-0.0101	-0.00412	-0.0364	-0.000895	-0.0175
	(0.0203)	(0.0269)	(0.0233)	(0.0223)	(0.0156)	(0.0243)
Log GHG	-0.662***	-1.193***	-1.121***	-0.0248	-0.165	-0.0198
	(0.232)	(0.341)	(0.283)	(0.296)	(0.197)	(0.299)
Rule of Law	0.0339	0.0174	0.175	0.264	0.402**	0.449
	(0.179)	(0.287)	(0.221)	(0.276)	(0.163)	(0.302)
Constant	12.79***	23.01***	22.29***	2.348	5.297	3.609
	(4.360)	(6.259)	(5.437)	(5.625)	(3.832)	(5.668)
Observations	1,296	1,296	1,296	975	932	932
R-squared	0.907	0.855	0.931	0.766	0.116	0.070
Number of Countries	48	48	48	39	59	59

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
All regressions include year-fixed effects

Table 11

	De Jure Measures				*De Facto Measures*	
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Sectoral	CrossSectoral	International	EPS	National	International
Panel A: Common Law Countries						
L.Climate Litigation	0.234**	0.312	0.257	0.203	-0.223	-0.143
	(0.0864)	(0.295)	(0.159)	(0.157)	(0.132)	(0.183)
Observations	243	243	243	225	195	195
R-squared	0.960	0.877	0.930	0.786	0.321	0.148
Number of Countries	9	9	9	9	12	12
Panel B: Civil Law Countries						
L.Climate Litigation	0.130	0.0806	-0.0988	-0.0439	0.00347	0.00422
	(0.0907)	(0.168)	(0.117)	(0.137)	(0.0544)	(0.0765)
Observations	1,053	1,053	1,053	750	737	737
R-squared	0.897	0.859	0.935	0.776	0.117	0.104
Number of Countries	39	39	39	30	47	47

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Regressions include all the controls and year-fixed effects

4 Discussion

As detailed in the literature review and the theoretical framework sections, scholarship has documented an active debate regarding the relationship between litigation

and regulatory change, and how climate-related cases can bring political debate into the courtroom. Landmark Dutch judgments, such as *Urgenda Foundation v. State of the Netherlands* (2015) and *Milieudefensie v. Royal Dutch Shell* (2019), exemplify this dynamic. However, while climate litigation cases have the potential to shape regulatory debates and corporate behaviour, empirical evidence on this topic remains limited and fragmented. Existing studies are relatively scarce and tend to focus predominantly on financial market responses, leaving broader regulatory dynamics underexplored. Against this background, the present contribution adopts a qualitative approach to examine how litigation events correlate with changes in environmental policy stringency and enforcement, while explicitly refraining from strong causal claims. Our perspective builds on the idea that climate lawsuits should be understood not as isolated legal events, but as part of a broader governance mechanism that complements traditional political and regulatory channels. Litigation is seen as a viable alternative (or complement) to traditional top-down political processes. All legal cases contribute to this dynamic: while landmark lawsuits led by prominent NGOs or advocacy groups often attract the most attention, smaller or individual claims can also play a role in shaping the legal discourse and policy responses to climate change (Ganguly et al., 2018). Furthermore, even unsuccessful cases may still exert normative and political influence. As Osofsky (2010) argued, climate litigation can generate both legal and moral pressure on institutions, create precedents for future claims, and foster public debate that, in turn, affects the regulatory agenda. In line with this literature, our analysis treats climate litigation as a meaningful proxy for the wider societal and institutional contestation over climate policy. Methodologically, to test the relation between the presence of climate litigation cases and the stringency of environmental policies, we constructed a panel of 64 countries over the 1990-2023 period. We first applied an OLS regression with clustered standard errors at the country level. Then, we employed a fixed-effects panel model to account for unobserved, time-invariant country characteristics. Additionally, to address potential dynamic effects and mitigate endogeneity, we included a one-year lag of the climate litigation variable and incorporated year-fixed effects. The results, which are consistent across models, indicate a positive and statistically significant relationship between climate litigation and the *de jure* policy stringency indices. No significant relationship was found with the *de facto* indices. The Findings also suggest that environmental policy stringency does not correlate with the GDP PPP, so that the rigour of environmental policies does not necessarily depend on a country's wealth. The modular structure of the CAPFM index, one of the *de jure* measures, enables a separate analysis of its three policy dimensions. This

allowed us to empirically investigate whether the correlation with the presence of climate litigation varies depending on the type of policy considered. Across increasingly detailed econometric specifications, the CAPFM Sectoral component is the one that consistently remains statistically significant. This specific dimension captures policies linked to determined sources or economic sectors. This result aligns with the nature of many climate litigation cases present in the database: a substantial proportion of cases involve claims against private companies, often focusing on compliance with regulatory standards and corporate accountability for environmental impacts. Furthermore, the results from the final set of estimates (Table 11) indicate that the observed correlation is predominantly influenced by common law countries, despite these constituting only 12 of the total sample. This finding aligns with broader legal literature: in common law jurisdictions, tort litigation has traditionally been seen as a decentralised, citizen-empowering mechanism for articulating and pursuing regulatory objectives, viewing plaintiffs and defendants as active agents rather than passive subjects of top-down regulation (Kysar, 2018).

When considered as a whole, these findings indicate that climate litigation, through its radiating effects, succeeds in capturing policymakers' attention: it is associated with an observable increase in the adoption of environmental laws. However, this does not lead to measurable improvements in enforcement. The ongoing gap emphasises a challenge in climate governance: while litigation can inspire policy innovation, ensuring effective implementation remains a critical unresolved issue.

5 Limitations and Future Developments

The identification and classification of climate litigation cases was based on a single, authoritative source of data, the Columbia Climate School and Sabin Center for Climate Change Law database, which provides a standardised codification. To illustrate this point, consider the *Lliuya v RWE AG* (2015) case. This was initiated by a Peruvian plaintiff, but adjudicated under German jurisdiction, and is recorded there according to the referenced database. While this approach inevitably entails some limitations, it represents the most rigorous and consistent method currently available for cross-country analysis. Strong and statistically significant correlations between litigation and policy stringency have been identified; the main obstacle to the next step, causal identification, is the possibility of reverse causality. Indeed, it cannot be excluded that increases in regulatory stringency in prior years (t-1, t-2, t-3, etc.) could stimulate litigation, which might then raise government awareness and lead to additional policy changes. Moreover, our case presents two distinctive aspects that

limit the application of standard difference-in-differences methods. Firstly, the treatment (climate litigation) does not occur simultaneously across countries. However, recent literature on staggered DiD (Callaway & Sant'Anna, 2021) has expanded to address this issue. These methods enable treatment at different times. Nonetheless, in these models, once a unit is treated (i.e. once a country experiences a case of climate litigation), it remains treated permanently. This does not align with the structure of our data. In our scenario, treatments are not only staggered but also recurrent: countries may face multiple instances of litigation in different years. This introduces the dimension of multiple treatments. To tackle these challenges, we will adopt a generalised difference-in-differences framework with multiple treatment periods.

Future research could identify, within the database, litigation cases brought against corporations and against states. This would allow us to test an additional hypothesis: whether the correlation with environmental stringency indices varies depending on the type of litigation, considering the potentially diverse mechanisms involved in these two types of climate lawsuits. Moreover, a more "canonical" staggered difference-in-differences design could be implemented. For each country, a single prominent climate litigation case (probably the one that received the most media attention) could be identified, using a robust measure to capture this aspect. This would help evaluate a clear "before and after" effect in policy stringency, providing a complementary perspective to the generalised difference-in-differences methodology.

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