The Governance Black Box Of Climate Finance Verification Firms

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Abstract

Over the past decade, climate-labelled finance has expanded rapidly, increasing reliance on verification firms that assess whether financial instruments qualify as green, sustainable, or taxonomy-aligned. Despite their growing influence, these actors have received limited systematic attention in climate-finance governance research. This article examines the governance of climate-finance verification, focusing on how verification firms exercise authority, respond to commercial incentives, and shape the standards that support credibility in sustainable-finance markets. Using a documentary and forensic approach, the study analyses 78 publicly available documents, including second-party opinions, assurance statements, issuer frameworks, and taxonomy assessments, and explores three cases in sovereign, corporate transition, and multilateral development bank contexts. The findings show that verification involves considerable methodological discretion, relies heavily on issuer-provided information, and lacks consistent accountability. Verifiers focus on procedural compliance rather than measurable climate outcomes, exposing structural weaknesses in climate-finance integrity. In addition to its institutional implications, verification practices also shape the spatial distribution of climate-aligned capital across regions and territories. Differences in verification capacity, regulatory environments, and data availability influence how climate finance is allocated across jurisdictions such as the European Union, multinational corporate markets, and multilateral development bank regions. By affecting where capital flows and which infrastructure projects receive climate-aligned labels, verification becomes a mechanism influencing regional decarbonisation pathways, territorial sustainability transitions, and uneven patterns of climate investment. Verification is therefore understood not as a minor technical step but as a central process through which environmental credibility is constructed, contested, and institutionalized.

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Introduction

The climate-labeled debt markets are becoming more and more popular in the past decade. In 2024, the number of green, social, sustainability and sustainability-linked (GSS +) instruments issued in the world was approximately USD 0.5 trillion and the overall outstanding volumes were over USD 5.7 trillion (Climate Bonds Initiative 2025). The development of climate finance enhances the use of verification to make credible claims, which also determines the spatial distribution of climate investment across sectors. This growth is part of a bigger change in financial systems, in which the consideration of sustainability is more and more built into the investment decision-making process and regulatory frameworks.

Verification determines the development of territories and the distribution of investments, however, they are less studied than financial instruments (Ehlers and Packer, 2017; Flammer 2021). The scrutinising actors in these markets are under-researched, and the available studies have indicated conflicts of interest, absence of accreditation, lack of transparency, and unequal accountability (Power, 1997; Buthe and Mattli, 2011; IOSCO 2021). Climate-finance verification is based on issuer information, accreditation that is limited, and subjective, which is why an independent and transparent management of the verification process is necessary to guarantee actual results. Meanwhile, verification exists at the nexus of market incentives and governance forms, as it determines the way in which the environmental credibility is created and understood in the context of financial markets.

These issues show that understanding unequal sustainability transitions requires an understanding of the relationship between climate finance and spatial inequality. The article claims that verification firms are privately regulating, and incentives issued by the issuers, poor transparency, and divided regulation undermine rigor, trust, and accountability. The paper will critically discuss the governance of climate-finance verification firms through the lens of their authority, methodological discretion, incentive structure, and transparency and evaluating the extent to which these will influence the credibility and spatial distribution of climate-aligned finance. This study, by placing verification as a governance tool as opposed to a technical process, adds to the knowledge of how climate finance determines the behaviour of markets and the sustainability of the region as well.

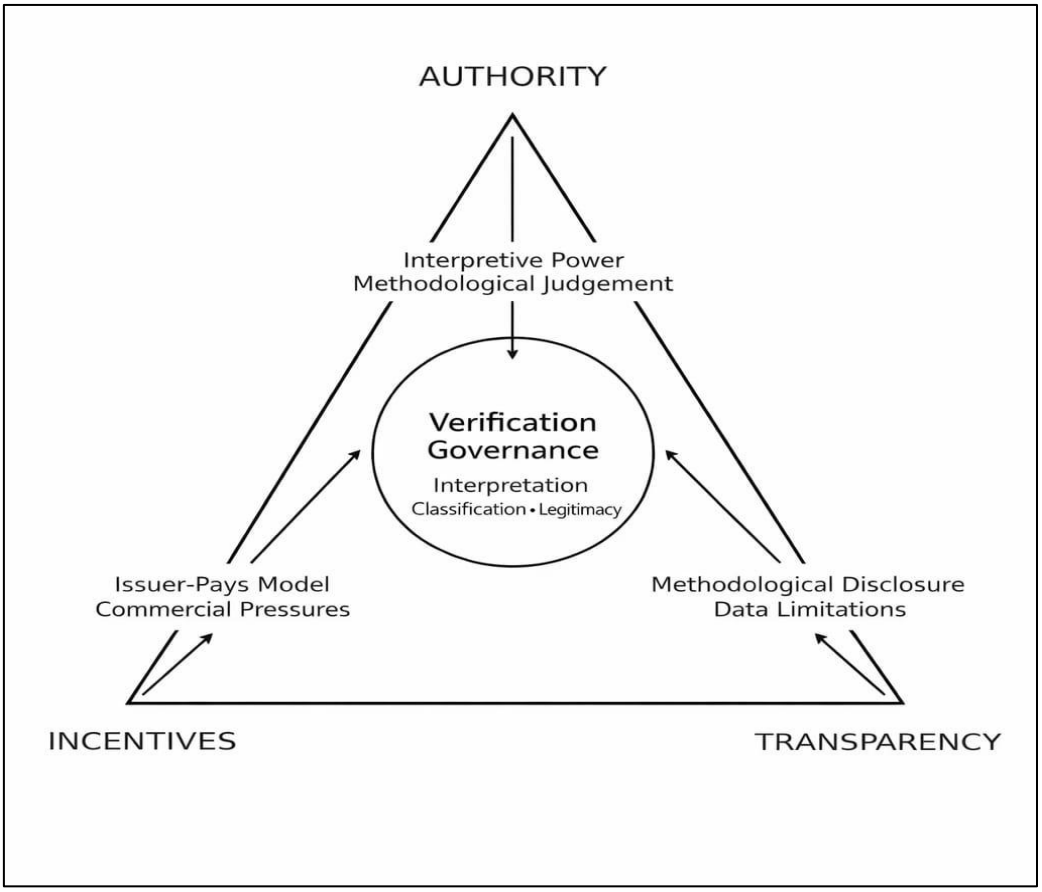

Fig. 1. Conceptual framework showing the interaction of Authority, Incentives, and Transparency as core governance dimensions of climate-finance verification, with verification as a process of interpretation, classification, and legitimacy formation

Sources: (Power 1997; Abbott & Snidal 2009; Büthe & Mattli 2011; Green 2014; IOSCO 2021; OECD 2022.

Literature Review

Climate finance has grown since the Paris Agreement, and verification is not well studied, and this part places it within the framework of governance, accountability, private power, and ESG assurance.

Climate-Finance Governance

The latest studies point to governance issues in the context of monitoring climate finance, such as the lack of definitions and cross-jurisdictional comparability (Weikmans and Roberts 2019; Pickering et al. 2020). The studies indicate that climate-finance systems are incomprehensive and they lack even coverage and uneven oversight and approaches (Clapp 2023; Rai et al. 2022). Climate finance is considered to be a hybrid form of governance with both public and private actors, which emphasizes on credibility and integrity. As (Flammer 2021) finds out, the price of green bonds depends on the perceived credibility of the bond to a large extent. Ehlers and Packer (2017) state that the most important part in the building of investor confidence is the third-party review. Verification is regarded as a stabilising mechanism that needs tighter examination, yet its techniques, motivation, and poor institutional basis (OECD 2022; EU Platform on Sustainable Finance, 2022). The more taxonomies are spread across the world, the more reliable they are becoming, in terms of how verification companies interpret and use screening criteria (Schütze and Willems 2022). Table 1 gives a typology of actors of verification in climate-finance markets, based on their functions, methodology, and risks.

Table 1. Typology of verification actors in climate-finance markets

Type	Typical Actors	Primary Function	Methodological Character	Common Risks
Specialist SPO Provider	Vigeo Eiris, Sustainalytics, S&P Global (SPO units)	Framework evaluation, use-of-proceeds alignment, SPOs	Proprietary; variable disclosure	Limited quantitative testing; issuer data reliance
Assurance / Professional Services Firms	Big Four sustainability/audit divisions, PwC, KPMG, EY, Deloitte	Limited assurance, procedural attestations	Audit-style procedures but adapted to sustainability	Qualitative judgements; potential conflicts with advisory services
Taxonomy Assessors / Technical Bodies	CICERO, CBI verifiers, specialised technical assessors	Taxonomy alignment, technical screening, DNSH checks	Rule-based where data allow; interpretive where not	Data gaps; discretion in threshold application

Sources: Authors' compilation based on the climate-finance and private-governance literature, including Power (1997); Büthe & Mattli (2011); Green (2014); EU TEG (2020); Christensen et al. (2022); IOSCO (2021).

Private Authority and Transnational Regulatory Intermediaries

Verification is exhibitive of the private power where non-state actors acquire the power of regulation using standards, certification, and the control of information (Buehte and Mattli 2011; Abbott and Snidal 2009; Avant etal.). 2010). According to the arguments of (Bernstein and Cashore 2007) and (Green 2014), the legitimacy of the private regulators depends more upon the expertise, the reputation and the adherence to the common goals rather than upon the legal requirements, and the latter are conditional and should be applied repeatedly. Likewise, verification companies become empowered because their practices and accreditations make SPOs viable pointers of environmental integrity. Power (1997) claims that the audit society embraces the assurance systems which frequently transform into the ceremony of scrutiny. Confidence creates legitimacy with vague standards, and the markets believe incomplete reporting because the intermediaries interpret standards (Christensen et al. 2022; Ameli et al. 2021). Verification firms serve as a middleman who interpret and frame the use of information, but their role is limited and can be subject to limited criticism (Hale 2020).

Insights From ESG Ratings, Sustainability Assurance, and Taxonomy Implementation

The ESG assurance research demonstrates that the structure of verification has weak points: providers lack consensus (Berg et al. 2022), and they are not very transparent about their strategies (Drempetic et al. 2020). These issues are complemented by the issues of conflicts of interests regarding issuer-pays models (IOSCO 2021). Sustainability assurance is frequently limited in its approaches, lacking in depth of audit, and dependent on company-supplied information (Boiral et al. 2018; Christensen et al. 2018, 2022).The process is complicated by taxonomy-governance research. In the EU, formal screening regulations continue to be evaluated on a case-by-case basis because of industries, uneven information and transition routes (EU TEG, 2020; Schutze and Willems, 2022). Verification firms do not apply rules non-partisan, they are familiar with how to read technical, normative and evidentiary ambiguities (Kling et al. 2023).

Spatial Dimensions of Climate-Finance Verification

New literature reveals that financial governance practices have an impact on the process of regional development and sustainability transition (Steffen 2021). Projects which are location-specific are financed by green bonds and sustainability-linked loans, which makes climate-alignment governance spatial in nature (Wang and Zhi 2023). Verification also affects the climate investment flows by identifying the projects that will be climate-labelled capital (Zerafa 2022). Better regulation, data and verification power is an attraction to investment and poor systems support unequal climate change.

Conceptual Framework

The concept of verification is based on four dimensions of governance: authority, incentives, transparency, and territorial impact. Territorial impact describes the influence of verification on the capital flows in the region and the increase in unequal access to climate finance. The authority expresses the ability of the verification firms to evaluate the environmental alignment in accordance with the expertise, accreditation, and market standards. Structural and commercial incentives such as issuer-pays models determine evaluator behaviour (Sinclair 2014; Ameli et al. 2021). Transparency is related to the clarity of the methods and data; the lack of transparency contributes to the rise in the information asymmetry (Christensen et al. 2022).

Materials And Methods

In this paper, the climate-finance verification governance is evaluated through documentary and forensic methods, which are appropriate to analyze the opaque institutional processes (Power, 1997; Buthe and Mattli, 2011). The method examines proprietary, customer-based verification, paying attention to the interpretation of rules, claim of authority, and the creation of legitimacy by the verifiers.

Corpus Construction and Data Sources

The emanatory corpus is composed of 78 publicly accessible documents that were published in 2020-2024. These are the views of the sovereign and corporate issues as a second party, annual allocation or impact reports with external assurance statements, issuer structures and prospectuses which include the governance options of the use of proceeds and methodological documents and technical notes. Corpus also has the evaluation of taxonomy alignment financing relating to multilateral development banks (MDBs). Some of the sources are issuer disclosure, verifier repository, Climate Bonds Initiative (CBI) registry, stock exchange listing, and regulatory database (IOSCO, OECD, EU). The analysis includes geographic variation in the context of sovereign, corporate as well as MDB to analyze the way verification works in varying conditions of governance and development.

Analytical Strategy and Coding Framework

The paper uses qualitative coding and comparative analysis of the 78 documents to discuss how verifiers make environmental credibility. Interpretive authority is examined based on the references to taxonomies, standards and criteria, and whether the evaluation is quantitative or narrative. The incentives are discussed in terms of issuer-pays models, repeat relationships and advisory overlap and the way the commercial relationships influence methodological rigor. Transparency is measured on the basis of clarity of methods, assumptions, data sources, independence statements, and dealing with uncertainty, and non-disclosure per se is a governance characteristic. Manual coding was done to maintain interpretative sensitivity as there were differences in document format, SPO language was qualitative and non-disclosure was important analytically. Table 2 demonstrates that the coding schema includes the analytical dimensions of authority, incentives, and transparency that are used to assess verification practices.

Table 2. Coding schema for analyzing verification documents across the Authority, Incentives and Transparency dimensions

Dimension	Indicator	Code (0/1)	Notes
Authority	Reference to taxonomies/standards	1	Does verifier cite ICMA, EU Taxonomy, CBI, etc.?
Authority	Use of proprietary methodology	1	Is a proprietary scoring framework referenced?
Incentives	Issuer-pays disclosed	1	Is fee relationship stated?
Incentives	Advisory-verification overlap	0	Evidence of advisory services provided to same issuer?
Transparency	Methodology published	0	Are thresholds, assumptions and scoring rules public?
Transparency	Explicit data limitations	1	Does the report state data gaps and caveats?
Transparency	Outcome verification present	0	Does verifier provide ex-post impact measurements?

Source: Authors' coding framework informed by qualitative document-analysis methods (Bowen 2009; Prior 2003) and by governance scholarship on private authority and assurance practices (Power 1997; Büthe & Mattli 2011; IOSCO 2021; Christensen et al. 2022).

Case Selection Logic

A most-informative-case approach was used to select three cases out of the entire corpus (George and Bennett, 2005) with the selection being driven by the focus on variation in the environments of governance and modalities of verification instead of statistical representativeness. The chosen cases are various kinds of verification such as a sovereign green-bond SPO, a corporate transition-finance SPO, and a taxonomy-alignment-evaluation associated with a multilateral development bank. These cases were selected in terms of the abundance of documentation available, which allowed them to be interpreted in detail, and their theoretical applicability to main propositions of analysis including methodological discretion, reliance on issuer disclosure, and fragmented accountability.

Analytical Procedure

The analysis was done in three phases. Within-document reconstruction entailed reading through the documents and determining evaluation claims, interpretive decisions, methods, and the mentioned limitations, especially focusing on eligibility criteria and the use of external standards and how uncertainty is treated. Patterns identification in cross-document Cross-document pattern identification was based on the structured coding matrix to define common themes in the dataset, such as high reliance on issuer-supplied data, methodological disclosure variation, inconsistent interpretation of similar constructs, transition finance strategies, and selective reporting of effects. Case-based comparative interpretation subsequently made the difference between broader systemic dynamics of governance, like issuer-pays incentives and interpretive variation, and case-specific features.

Ethical Considerations and Limitations

The research is based solely on publicly accessible documents and no proprietary or internal data is used. Although this method is suitable in the evaluation of opaque systems of governance, it also reveals internal constraints of transparency and accountability in the verification practices (Power, 1997; Buthe and Mattli, 2011).

Results

Mapping the Verification Ecosystem

Verification firms are central to climate-finance governance but remain underexplored, and this section maps their actors, functions, and governing logics.

Categories of Verification Actors

SPO providers, audit firms, and taxonomy assessors are verified, with SPOs in the middle but under weak accreditation and different disclosure (Maltais and Nykvist, 2020; Ehlers et al.). The standards such as ISAE 3000 are applicable to audit and assurance firms, but verification is still judgmental because of the limited data and differences in definitions of climate-compatible activities (Bracking 2021; Christensen et al. 2022). Regardless of the different forms of governance, all systems are based on the use of professional judgment because of qualitative criteria and insufficient data (EU TEG, 2020).

Functional Roles and Market Power

There are three governance functions that are interrelated and undertaken by verification firms. Taxonomies and issuer narratives are interpreted by firms to understand environmental alignment and proprietary methodologies bring significant variation even to firms that are assessing similar instruments (IOSCO 2021). The process of verification eases the environmental data of investors and verified instruments receive superior pricing and increased attention (Ehlers and Packer, 2017; Flammer 2021). The reports are verified by reports that show environmental integrity, and the verifiers are the independent regulators that are trusted to be accepted in the regulation and confidence in investors (OECD 2025).

Governance Logics Shaping Verification Practices

Climate-finance verification employs three governance logics and is subjective because of the difference in the way criteria are interpreted. Power (1997) explains that assurance systems are not implemented in fixed rules and interpretation processes are manifested in climate-finance verification. Verification outcomes are influenced by commercial incentives, and advisory overlaps, repeat engagements and issuer-pays models impose dependencies akin to ESG rating markets (IOSCO 2021). In the absence of formal regulation, companies rely on voluntary standards, CBI accreditation, or reputation, which leads to the inconsistency of practices, poor transparency, and lack of accountability (Bracking 2021; OECD 2022).

Implications for Climate-Finance Integrity

The implications of the verification ecosystem structure on the system are that divergent methodologies decrease comparability, weakening market integrity, issuer-pays incentives introduce conflict of interest, weakening analytical independence and fragmented accountability restricts scrutiny, and methodological opacification is allowed to persist. One of the governance functions that define market decisions and legitimise environmental claims, which are key to effective climate finance, is verification. The verification varies according to the region where strict EU systems and MDB dependence are more likely to influence the standards and capital movements in the Global South.

Case Vignettes

Three cases use post-2021 verification documents to examine authority, information gaps, and legitimacy, focusing on governance rather than outcomes, consistent with private authority literature (Buthe & Mattli, 2011; Abbott & Snidal 2009; Green 2014).

Case 1-Spain's Sovereign Green Bond (Vigeo Eiris, 2021): Procedural Authority in a High-Disclosure Context: The Spain 2021 Green Bond case shows verification relied on ICMA procedures and issuer data, lacking outcome assessment and transparency, leading to credibility-based judgments. Sovereign green bonds shape regional infrastructure investment, with verification influencing territorial decarbonisation. The case shows verification relies on institutional authority, where credibility stems from procedures and trust rather than proven outcomes, with limited transparency.

Case 2- Iberdrola's Green and Transition Financing (V.E 2022; Moody's 2023): Divergent Judgements Across Competing Verifiers: Iberdrola's framework is a comparative case reviewed by multiple verifiers due to its similarity to other instruments. The SPOs of Vigeo Eiris (2022) and Moody (2023) come to the same general conclusion, which represents the credibility of the framework and adherence to the ICMA Principles, but differ in their analytic foundation. Corporate transition finance has spatial impacts, with Iberdrola's regional investments shaped by verification decisions on climate-compatible projects. Vigeo Eiris emphasizes ESG governance and procedures, while Moody's focuses on sector decarbonisation and transition coherence; both rely on issuer data with limited transparency in methods. The case shows ESG rating disparities arising from differing interpretations of the same information, consistent with existing literature (Berg et al. 2022), and this method is now being replicated in climate finance verification. Verifiers apply similar criteria but differ in assumptions, reflecting judgment-based processes shaped by issuer-pays relationships and structural dependence (Christensen et al. 2022; Ameli et al. 2023) and is observed in IOSCO (2021).

Case 3- MDB Infrastructure Taxonomy Assessment (CICERO, 2021): Technical Rules and Professional Judgement in a Taxonomy-Driven Context: The CICERO MDB case shows taxonomy-based verification relying on narrative judgment and proxies due to data gaps, without measurable performance indicators. Verification is essential to sustainability routes in the Global South since MDB projects demonstrate that taxonomy alignment affects both credibility or investment placement. As verifiers rely on judgment under scant evidence, formal taxonomies change rather than eliminate discretion, indicating fragmented responsibility (Bracking 2021; EU Platform on Sustainable Finance, 2022).

Cross-Case Synthesis: Verification as a Governance Arena

It is clear from these examples that verification takes into account the trust gap discussed by Weikmans and Roberts (2019) or Bracking (2021) where compliance with procedure has precedence over climate impact. Verification gaps are evident in the area of ESG assurances because a lot of evidence is dependent on the issuer's information without independent verification (Boiral et al. 2018; Christensen et al. 2022). Discretion in methodology characterizes verification (Suchman 1995). There are inconsistencies in ESG ratings because of differences in evidence weights, screening processes, and ways of managing uncertainty on the part of the provider for the same issuer (Berg et al. 2022; Drempetic et al. 2020). Issues of private environmental governance are seen in verification because of inadequate accountability through fragmented accreditation, lack of transparency, and unclear methodologies (Green 2014; Abbott et al. 2016). There are variations in the verifiers involved and instruments used, as Table 3 shows below.

Table 3. Verification Case Summary (Structural Features)

Case	Instrument Type	Verifier Type
Spain (Sovereign) – V.E (2021)	Sovereign Green Bond	SPO Provider
Iberdrola (Corporate) – V.E (2022); Moody's (2023)	Green / Transition Finance	Multiple SPOs

MDB Infrastructure – CICERO (2021)	MDB-linked Infrastructure	Taxonomy Assessor

As shown in Table 4, verification evaluations highlight governance risks such as procedural bias, interpretive divergence, and data limitations.

Table 4. Governance Characteristics of Verification Evaluations

Case	Methodological Transparency	Independence Statement	Outcome Verification	Key Governance Risk
Spain – V.E	Partial	Yes (standard)	No	Procedure over outcomes
Iberdrola – V.E & Moody's	Limited (proprietary)	Yes (varies)	No	Interpretive divergence; issuer-dependence
MDB – CICERO	Medium	Yes (but MDB dependence)	No	Data gaps; discretionary application

Table 4 outlines the governance characteristics of verification evaluations, highlighting key risks such as procedural bias, interpretive divergence, and data limitations.

Discussion

Verification is a flawed yet essential method of governance that depends on factors like knowledge, market demand, or delegation, with firms becoming regulators de facto. Uncertainty and discretion is another prevalent topic. According to SPOs, compliance, not performance, comes first (1997), since the assurance can be gained through the application of certain procedures, instead of the actual verification. It is in line with criticism about sustainability governance, where authoritative labels are created due to uncertainty and ambiguity of the information (Green 2014). This discretion can be seen in the Iberdrola example, where several verification processes led to the same conclusion despite differences in the data and procedures used (Berg et al. 2022; Drempetic et al. 2020). In this regard, verifiers are perceived more as judgment-based agents who make their value choices, rather than impartial judges, corroborating the point raised by Abbott & Snidal (2009): private regulators obtain their authority through reclassification of ambiguity issues. Owing to data constraints, the MDB case proves the necessity of discretion even in a procedure-oriented taxonomy (Schutze and Willems, 2022; EU Platform, 2022). More than discretion, a payment by the issuers approach adds another layer of power, whereby verification processes are subject to the same logic of credit ratings, environmental, social, and governance ratings (IOSCO 2021; Christensen et al. 2022), as well as sustainability assurances (Boiral et al. 2018), where customer dependence can influence the thoroughness and tone of assessments (Lindenberg 2014). This demonstrates interpretative coherence based on the issuer narrative and uncertainty and not intentional looseness, which goes against (Christophers 2022), who suggests that climate finance is often market-conforming. In accordance with (Bernstein and Cashore 2007), such systems of non-state governance require institutional support to retain legitimacy, hence leading to governance thinness, as per (Bracking 2021). Despite their pivotal role, although evaluation processes remain insufficient, ineffective verification undermines trust and poses risks to classifications since businesses act as intermediaries between laws or market practices (Rai et al. 2022; Clapp 2023). Consequently, verification emerges as a vital governance activity that holds tremendous influence but remains vulnerable structurally because of the credibility constructed through institutions (Bracking 2021; Green 2014; Christophers 2022). Spatially, the process of verification leads to an unequal climate transition where better-developed countries draw a greater share of climate capital as compared to less-developed nations due to their lower institutional capacity and verification system. It is crucial to have methodological transparency because the absence thereof only increases variability, reduces reliability, and decreases the possibility of critical review (Berg et al., 2022; Christensen et al., 2022; Drempetic et al., 2020). While there are some frameworks proposed by the EU Although the Platform on Sustainable Finance (2022) and the OECD (2022), the voluntary nature of those guidelines makes them not very effective. To achieve inclusiveness in climate finance, regional variations require international cooperation and regional considerations as well (Bernstein and Cashore 2007). The problem of independence is another issue that arises in the issuer-pays approach, requiring modifications such as transparency, oversight, rotation, and the separation of advisory roles and verification (Humphrey et al. 2009). More broadly, since private governance can only be sustainable if it forms part of sound meta-governance arrangements, then more rigorous monitoring and certification practices become necessary (Bernstein and Cashore 2007; Abbott et al. 2016; Green 2014). While more accurate and quantitative metrics will aid in climate impact verification (IPCC WGIII 2022; GFANZ 2022), applying outcome-based logic to climate verification could help connect financial actions with quantified climate impacts (Pauw et al. 2020; Pickering et al. 2020; Weikmans and Roberts 2019). The modifications have to be aligned with new taxonomies which depend on verification for the interpretation (Schütze & Willems 2022). The institutional backing, harmonization, and openness become imperative in the process. As explained by Christophers (2022), Clapp (2023), and Moss and

Newell (2015), the concept of verification serves as the governance of the whole system where legitimacy depends upon alignment.

Conclusions

The study demonstrates that climate finance verification is a governance mechanism that affects the functioning of sustainable finance markets in terms of their legitimacy rather than being an administrative process. This paper has found out that verification firms act as quasi-regulators of the market because they possess discretionary power in terms of methods, interpretations, and use of information from issuers. Climate finance verification processes have been found to prioritize process compliance over climate impact measurements in various settings such as sovereign bonds, corporate bonds, and MDBs. Three structural weaknesses that have been noted in the verification system have been listed below. Firstly, the diversity in methodology weakens the comparability among different measurement tools. Secondly, the incentive-based dependency created due to the 'issuer-pays' principle can potentially weaken the review process. Thirdly, the lack of accountability due to dispersed authority and absence of transparency allows for obscurity to prevail. Despite growing importance and scope, these factors undermine the veracity of climate finance markets. The analysis highlights the geographical consequences of verification and illustrates the role played by institutional capacities, information access, and legal framework in the allocation of green capital and uneven transition towards sustainable development in different locations. Verification proves to be a potent but institutionally weak element of the climate finance governance architecture. Improvement of its effectiveness needs methodological clarity, clear accountability mechanisms, and consistency of verification processes with climate impacts for the effective use of climate finance.

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Conflicts Of Interest

The authors declare that they have no conflict of interest regarding the publication of this article.

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