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## RESEARCH ARTICLE OPEN ACCESS

# Mapping Instrument Preferences for Deforestation Policies Based on EU Public Consultation Data

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## ABSTRACT

Policy makers can choose among many alternative policy instruments to reduce the impact of EU commodity imports on forests and related biodiversity loss in the world. Changes in the instrument mix affect a wide range of stakeholder groups with varying strategic interests and corresponding policy preferences. Given the significant role of stakeholders in the development and implementation of EU environmental policies, a better understanding of these preferences is needed. We address this knowledge gap by exploring stakeholders' preferences for instruments during the development of the EU Regulation on Deforestation-free Products (EUDR) with a mixed-methods approach. We conduct a principal component analysis (PCA) to identify patterns in stakeholders' evaluations of 14 alternative policy instruments to counteract deforestation induced by EU consumption. The PCA reveals four distinct groups of instruments for which preferences of different stakeholder groups align. These groups separate instruments with predominantly mandatory elements from international policies, voluntary policies, and policies reflecting the current EUDR solution. Regression analyses and supplementary interviews with business associations offer further insights into overlaps as well as inconsistencies and conflicts across stakeholder groups in terms of their preferences for different groups of policy instruments to counteract deforestation.

## 1 | Introduction

Forest ecosystems are home to most terrestrial biodiversity, including 60,000 different tree species, 80% of amphibian species, 75% of bird species, and 68% of all mammal species (FAO and UNEP 2020). More than 10 million ha of forests are lost each year due to deforestation and forest degradation (Clancy et al. 2024), which are among the main drivers of global biodiversity loss. The European Union (EU) contributes significantly to global forest loss through the consumption of agricultural and forest products imported from regions with a high risk of deforestation. Trade with the EU was shown to be associated with almost 250,000 ha of global deforestation each year (European Commission 2021a).

To reduce its impact on global forests as well as biodiversity and their complex relationships with societal well-being (Metz and Ingold 2014), the EU is continuously revising its domestic and international policy mix. This includes the development of new and innovative policy instruments, such as mandatory due-diligence requirements, which are increasingly subject to academic and policy debates (Schilling-Vacaflor and Lenschow 2023; Ventura 2023). One of the most recent additions to the EU's biodiversity policy mix is the EU Regulation on Deforestation-Free Products (EUDR), which can be considered an innovative environmental trade policy instrument.

The EUDR is the product of a comprehensive stakeholder consultation process, and while preferences for climate policy mixes

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among stakeholders have been extensively studied (Bellamy et al. 2021; Grafakos et al. 2010; Kalfagianni and Kuik 2017; Kammermann and Angst 2021; Lindberg et al. 2019; Molenveld et al. 2020; Rhodes et al. 2017), our knowledge of stakeholder preferences for instruments used in the context of anti-deforestation and biodiversity is limited (for notable exceptions, see Klassert and Möckel (2013) and Echeverri et al. (2023)). Given the increasing attention to the evolving biodiversity crisis in academia and society, a more profound understanding of preferences for policy instruments in this field is warranted. Research in the domain of climate policy emphasizes the strong influence that stakeholders can have on environmental policy processes (Böhler et al. 2022; Rietig 2016; Serna-Ortega et al. 2025). For instance, in the case of the EU's 2030 Climate and Energy Policy Framework, the study of Ydersbond (2018) describes that the utilities industry, represented by organizations such as Eurelectric, pushed for an overarching greenhouse gas (GHG) emissions reduction target of at least 40%, while also advocating for alignment between targets for renewable energy and energy efficiency. The preferences of this stakeholder coalition were reflected in the final agreements, demonstrating the substantial influence that stakeholders can achieve by the combination of organized advocacy, strategic coordination, and the alignment of interests. In contrast to common climate policy measures such as carbon pricing or renewable energy promotion, the EUDR, which also targets biodiversity, was primarily designed as a mandatory due diligence regulation. Its novel intended working mechanism relies on the EU's market power to influence sourcing and production practices in major trading partner countries. As such, we must expect corresponding processes of preference formation among stakeholders whose economic interests are affected by the regulation. The EUDR likely affects the preferences of a larger international group of stakeholders compared to conventional environmental policies that are rather limited to national domains.

Drawing from policy analyses employed in adjacent environmental policy domains (de Boon et al. 2021) and utilizing a mixed methods approach, this study explores stakeholders' preferences for 14 single instrument options to target consumption-induced deforestation. These alternative instrument options were discussed in the policy process that informed the design of the EUDR as part of a public consultation. Based on a new data set that emerged from this consultation process, this study explores stakeholder groups' preferences by employing principal component analysis (PCA), linear regression analyses, and supplementary interviews with German business associations. The main research aim is to map patterns of instrument combinations, investigate stakeholder groups' preferences for these combinations as well as single instruments and identify overlaps, inconsistencies and conflicts across stakeholder groups in terms of their preferences for different policy instruments and groups thereof to counteract deforestation. In addition, we contribute to the classification of policy instruments by following an inductive approach derived from stakeholder preferences.

## 1.1 | Classifications and Evaluation Criteria for Policy Instruments

Classifying policy instruments based on their shared characteristics allows the study of stakeholder preferences at higher levels

of generalization than in analyses of single policy instruments. Within the field of environmental policy analysis, several systems for categorizing and classifying policy instruments have emerged. Two major distinctions are often made between “traditional” instruments, which are usually “command-and-control” regulations, and so-called “new” environmental policy instruments (NEPIs) (Gunningham et al. 1998; Jordan et al. 2005; Wurzel et al. 2013, 2019). NEPIs can be further structured into informational (e.g., eco-labels and environmental management schemes), voluntary (e.g., voluntary agreements), and market-based instruments (e.g., eco-taxes and emissions trading) (Wurzel et al. 2019). Börner and Vosti (2013) classify environmental policy instruments in terms of their functional mechanisms, which are likely to provoke variations in stakeholder responses. They distinguish between: (i) *enabling measures* like improved technologies, environmental education, or credit, that is, instruments, which foster general conditions that allow actors to behave in a way that environmental goals can be reached, (ii) *incentive-based instruments*, such as subsidies, tax exemptions, and certifications as well as (iii) *disincentive-based instruments* like taxes/user fees, regulations, and fines which encourage or discourage certain behaviors of actors so that environmental goals can be reached. Regarding their degree of policy intensity and density, “command-and-control” regulations as well as disincentive-based instruments can typically be assigned a high level of policy intensity whereas informative and voluntary instruments in the NEPI category as well as incentivizing and enabling measures show a rather low level of policy intensity (Zhang et al. 2022; Dong et al. 2024).

Given the multitude of challenges and objectives associated with policies for deforestation prevention and biodiversity conservation, the policy density, which can be defined as the number of instruments present in the instrument mix of a certain policy domain (Schaub et al. 2022), is an important aspect of instrument mixes. While stakeholders' underlying policy beliefs, about for example the role of market mechanisms and the relevance of the regulatory state, will to some degree fall into line with these textbook classifications, stakeholder preferences will most certainly not perfectly align with the theoretical distinctions discussed above. The inductive, data-driven approach we apply in this study allows us to learn from real world combinations of stakeholder preferences and thus complements deductive approaches to instrument classification.

Policy evaluation commonly relies on a set of normative and analytical criteria that help determine whether a policy performs well across multiple dimensions of public value. Scholars often use a set of core evaluation criteria (Table 1) that include effectiveness, efficiency, equity, feasibility, and acceptability or legitimacy (Rossell 1993; Bigano et al. 2016; Shahab et al. 2019). These dimensions collectively capture the trade-offs between instrumental performance, distributive justice, and institutional or political viability. In contemporary governance contexts, characterized by complex multi-level systems and diverse stakeholder constellations, additional criteria such as sustainability, flexibility, and policy coherence have become increasingly salient (Sherman and Ford 2014; Sandin et al. 2019). These criteria can be applied for understanding not only whether policies work, but how and for whom they generate benefits and burdens.

**TABLE 1** | Core criteria for policy evaluation.

| Criterion                    | Definition/focus                                                                                 |
|------------------------------|--------------------------------------------------------------------------------------------------|
| Effectiveness                | Extent to which a policy achieves its stated objectives or desired outcomes.                     |
| Efficiency                   | Relationship between inputs and outputs; achieving goals with minimal resource use.              |
| Equity                       | Fair distribution of costs and benefits across social groups and generations.                    |
| Feasibility                  | Administrative, technical, and political practicality of policy implementation.                  |
| Acceptability/<br>Legitimacy | Degree of support among key stakeholders, affected publics, and decision-makers.                 |
| Sustainability               | Capacity to maintain policy outcomes over time without undermining social or ecological systems. |
| Flexibility/<br>Adaptability | Ability to adjust to changing circumstances, learning, and feedback.                             |
| Coherence/<br>Coordination   | Consistency and alignment with other policies, institutions, and stakeholder interests.          |

While evaluation criteria serve as widely recognized reference points for policy analysis, their relative importance varies across stakeholder groups. Different actors apply distinct normative and practical lenses when judging policy instruments. For instance, businesses may privilege efficiency and feasibility (Shahab et al. 2019; De Brucker et al. 2013), environmental NGOs favor effectiveness and sustainability (De Brucker et al. 2013; Sandin et al. 2019), while community organizations emphasize equity and legitimacy (De Brucker et al. 2013; Sherman and Ford 2014; Renn 2015). This variation reflects both material interests and underlying values about what constitutes “good policy.” From a stakeholder-preference perspective, these distinctions are particularly relevant, as they help explain why consensus around certain policy designs is difficult to achieve even when objectives are broadly shared. Identifying and distinguishing these criteria therefore contributes to understanding the mechanisms through which stakeholder perceptions and preferences are formed.

## 1.2 | The EUDR in the Context of the EU's Anti-Deforestation and Biodiversity Policy Mix

European policymaking can be described as a multi-actor, multi-level governance arrangement in which various EU, national and regional authorities as well as stakeholders are involved in the design, implementation and evaluation of policies (Piattoni 2010). Within the EU's broader biodiversity and environmental strategies, forest conservation policies play a crucial role. A Forest Strategy that includes measures for sustainable forest management, forest protection, and combating illegal logging has been developed and the EU Forest Action Plan outlines specific actions to promote biodiversity

conservation and sustainable forestry practices (European Commission 2024). The EU's approach also involves the action plan Forest Law Enforcement, Governance and Trade (FLEGT). It aims to ensure that only legally harvested timber and timber products are imported into the EU. The EU Biodiversity Strategy for 2030 includes domestic and global targets related to increasing forest coverage, improving forest health and resilience, and promoting sustainable forest management practices. The EU Timber Regulation (EUTR) came into force in March 2013. It was introduced as part of the European Union's efforts to combat illegal logging and associated trade. The regulation prohibited companies from placing illegally harvested timber and timber products on the EU market and required them to exercise due diligence to ensure the legality of the timber they trade.

On 17 November 2021, the European Commission launched the proposal of the EU Regulation on Deforestation-free Products (EUDR), which was to replace the EUTR. The goal was to decrease deforestation and forest degradation caused by EU consumption and the associated expansion of agricultural land used to produce cattle, cocoa, coffee, palm oil, soy, wood and some derivative products thereof like chocolate, leather, and furniture. It was based on a European Parliament resolution from 2020, which called for regulatory action to act upon global deforestation caused by the EU. The EUDR has been designed as a mandatory due diligence regulation, demanding companies that trade with the affected agricultural commodities and products to ensure their supply chains are deforestation-free, that production complies with national law, and that a due diligence statement is provided for each product entering or leaving the EU market (European Commission 2021b). The regulation also includes mandatory reporting obligations for companies. In addition, the EU will provide country benchmarking to support the risk assessment process. Although business associations emphasize the industries' commitment to help protect forests globally, their criticism is focused on details in the design and implementation of the EUDR. As it was phrased in one common industry position paper in early 2023, “the bureaucracy, effort and costs associated with implementing geolocation, requirements concerning evidence and the segregation of commodity flows within a very short space of time will put a strain not just on the countries of origin outside of Europe, but on farmers and operators within the EU as well” (BDSI, BGA, BVE, DAH, German Coffee Association, DRV, DVT, Grofor, OVID and German Cocoa Trade Association 2023). In more recent position papers and press releases, the criticism of high cost, especially because of necessary technological developments for EUDR compliance as well as the high administrative effort associated with the due diligence statements remains. The EUDR is used as a case study in this paper due to its high current relevance for affected stakeholders, the EU and its trading partners' agricultural sector as well as its importance for the EU's endeavors in forest protection and associated biodiversity conservation.

## 1.3 | Stakeholder Involvement and Influence in EU Policy Development

The complex and diffuse nature of environmental issues like biodiversity and the heterogeneity of agricultural systems causes

policies for sustainability transformations in agriculture to often affect a great variety of stakeholder groups (Santos et al. 2006; van den Hove 2000). It has been argued that instrument mixes developed and implemented with an emphasis on stakeholder involvement are likely to be more successful as the involvement fosters social acceptance (OECD 1999). In EU politics, the regular involvement of stakeholders through measures like public consultations, workshops, hearings, or surveys is thus being promoted by the Commission's Better Regulation Agenda and has become an essential part of the political process. The influence of these groups can be correspondingly large, especially when stakeholder groups with similar interests liaise in coalitions to exert influence on the political process with pooled resources

and efforts (Heaney and Lorenz 2013; Junk 2019; Sabatier 1988; Victor et al. 2018).

The policy process of the EUDR encompassed several stakeholder consultation initiatives as part of the impact assessment of demand-side measures to address deforestation and forest degradation. The primary purpose of these initiatives was to gain insights from different affected groups to follow a holistic approach in the policy design process and to get a good understanding of the effects that a new policy might have on actors from industries, society, and politics. As part of the European Commission's consultation strategy, relevant stakeholder groups were identified (Wood Group 2021). The results are summarized in Table 2.

**TABLE 2** | Stakeholder groups identified in the context of the European Commission's impact assessment of demand-side measures to address deforestation and forest degradation as well as the respective roles and relation to EU deforestation policies of those stakeholder groups.

| Stakeholder group                                                                                                              | Role/relation to EU deforestation policies                                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Businesses</b>                                                                                                              |                                                                                                                                                                                                                                                                         |
| Farmers, both large-scale agri-businesses and small-scale local producers, including livestock producers, both large and small | Activities of this group sometimes contribute to deforestation by clearing forests for agricultural purposes; they can therefore be highly affected by new deforestation related EU policies                                                                            |
| Logging, wood-processing companies and forest owners                                                                           | This group may contribute to deforestation, even if legally, and therefore be affected by new deforestation related EU policies                                                                                                                                         |
| Businesses operating with commodities associated with deforestation and forest degradation                                     | Businesses might contribute to deforestation along their supply chains; businesses and their operations can therefore be affected by new deforestation related EU policies; can provide insides on potential economic effects of respective policies                    |
| Traders working with supply chains potentially associated with deforestation                                                   | Business operations in relevant industries (e.g., food products, timber products, mining products, etc.) of this group would be affected by new deforestation related EU policies                                                                                       |
| <b>NGOs</b>                                                                                                                    |                                                                                                                                                                                                                                                                         |
| Civil society organizations and non-governmental organizations                                                                 | Have a high interest in the issue of deforestation and in a broader sense the environmental and social effects that new EU deforestation policies might entail; can provide insides on potential environmental and social effects of respective policies                |
| <b>Citizens</b>                                                                                                                |                                                                                                                                                                                                                                                                         |
| Citizens                                                                                                                       | Citizens from the EU and from third countries may be concerned with and/or affected by deforestation in their respective countries and have first-hand knowledge of current impacts; might have special interest with regards to social/environmental impacts           |
| Consumers and consumer organizations                                                                                           | Would especially be affected by consumption-oriented deforestation policies                                                                                                                                                                                             |
| <b>Research</b>                                                                                                                |                                                                                                                                                                                                                                                                         |
| Research institutions                                                                                                          | Provide scientific expertise in different areas associated with deforestation and deforestation policy, including environmental, social, economic and legal aspects                                                                                                     |
| <b>Other</b>                                                                                                                   |                                                                                                                                                                                                                                                                         |
| EU Member State authorities                                                                                                    | Responsible for implementing EU measures                                                                                                                                                                                                                                |
| Third-country stakeholders                                                                                                     | Public authorities from these countries may be concerned with and/or affected by deforestation; they might be highly affected by new deforestation related EU policies                                                                                                  |
| International organizations                                                                                                    | Stakeholders in this group monitor deforestation and forest degradation on an international scale, which can contribute to a better understanding of the overall impact of EU consumption in a variety of countries, as well as how the situation has evolved over time |

The involvement of a diverse set of stakeholders in the development process can lead to higher social acceptance of environmental policies (van den Hove 2000) and mixes thereof (de Boon et al. 2021). It allows policy makers to learn from stakeholders, which in turn can lead to better informed decisions for policy design and implementation. It broadens the policy debate to alternative perspectives and enables policy makers to convince those affected by their decisions, build trust and form alliances. Involving stakeholders can therefore increase the legitimacy and societal feasibility of policies and instrument mixes (Irvin and Stansbury 2004).

However, involving stakeholders also entails additional costs, effort, and has the potential to backfire and create hostility towards policy makers instead (Irvin and Stansbury 2004). The impact of competing coalitions on the policy process can cause inefficiencies. For example, in the case of the EUDR, the study of Berning and Sotirov (2024) concluded that the final legislative text is a compromise solution, reflecting a mixture of pro and contra regulatory policy beliefs and interests of different state and non-state actors. Two powerful coalitions of actors in favor of political change were successful in incorporating their positions in the EUDR legislative text. If a process of policy formulation is subject to the power dynamics between coalitions of stakeholder groups with different or even opposing positions, interests, values, and political leverage, the outcome may not effectively address the underlying environmental challenge. Depending on the most successful coalitions, they could rather reflect individual economic interests, such as to maintain the regulatory status quo, eliminate competition and maximize corporate profits, or develop new markets and trade relationships. Such economic interests might potentially be achieved in synergy with environmental goals, but also bear the risk of jeopardizing sustainability endeavors. The latter was the case for the EUTR, which was strongly influenced by the strategic support of stakeholders from the forest and retail industry (Sotirov et al. 2021, 2017). The incorporation of these stakeholders' interests into the finally adopted policy design led to implementation and enforcement issues, limiting the EUTR's regulatory effectiveness to achieve the intended sustainability goals such as reducing illegal deforestation (Leipold et al. 2016; McDermott and Sotirov 2018; Moser and Leipold 2021). However, when it comes to EU deforestation policies, coalitions in favor of environmental protection have, overall, been more successful in influencing the policy process during recent decades (Sotirov et al. 2021). Nevertheless, awareness and understanding of stakeholder preferences, including the factors leading to coalitions among particular interest groups and their potential influence on the policy process, can help policy makers to design policy mixes that are socially acceptable, effective, and efficient.

While this study primarily focuses on deforestation-related instruments, it is worth mentioning that broader cross-sectoral linkages in EU policy-making exist. Deforestation and biodiversity policies do not operate in isolation but interact closely with other domains such as agriculture, food systems, trade, and development cooperation. Instruments like trade agreements or development assistance already embody this integration by linking environmental objectives with economic and social policy goals. Support or opposition to specific environmental instruments may therefore reflect strategic positioning within

these overlapping policy regimes. For instance, businesses may oppose stringent environmental requirements due to concerns about trade competitiveness, while NGOs may advocate for their inclusion in trade agreements to raise international standards. These interactions illustrate that policy coherence across sectors is essential for effective implementation of the EU's deforestation agenda.

#### 1.4 | Determinants of Policy Preferences Across Stakeholder Groups

Stakeholder groups' preferences for policy instruments are shaped by multiple distributional dimensions: social, economic, temporal, and spatial. Social factors such as trust, norms, and demographic characteristics significantly affect preferences. For example, higher social trust, that is, the generalized expectation that others will act honestly and cooperatively, grounded in shared moral norms and values, often leads to a preference for market-based or indirect policy instruments like price mechanisms or collaborative measures (Cho and Moon 2019; Guillaud 2011; Lin and Yang 2023). Economic position is also a central factor as higher incomes and stable employment generally prefer less redistributive, market-oriented policies, whereas groups and individuals facing economic insecurity favor stronger redistributive interventions (Guillaud 2011; Lin and Yang 2023). Temporal dimensions further condition these preferences, as time orientation shapes policy acceptability, particularly in environmental and climate contexts. Societies, groups, or individuals with long-term orientations express greater support for mitigation and sustainability-oriented policies. Conversely, short-term orientations, often reinforced by economic precarity, can dampen willingness to bear immediate costs for future gains (Alló and Loureiro 2014; Schaub 2022; Vona 2023). The spatial dimension adds another layer of differentiation. Geographic location, proximity to policy impacts, and regional economic context influence preferences. Urban and economically dynamic regions show higher support for investment and innovation policies, while rural or declining regions exhibit stronger resistance to redistributive or consumption-side measures (Banerjee et al. 2020; Pinggera 2023). Spatial proximity to the benefits or costs of policies, such as renewable energy projects or conservation initiatives, also increases support or rejection by affected stakeholder groups, respectively. Studies using spatially explicit approaches, such as individualized choice maps, demonstrate that local contextualization enhances both preference measurement and policy legitimacy (Badura et al. 2020; Knapp and Ladenburg 2015).

Drawing from stakeholder and policy analyses employed in adjacent environmental policy fields, assumptions about the preferences of specific stakeholder groups can be made and applied to the policy domain of anti-deforestation and biodiversity. We focus on the major stakeholder groups that are relevant for the further analyses of the EUDR public consultation survey data, which are businesses, NGOs, citizens, and research organizations. In general, we expect stakeholders to prefer those instruments and instrument mixes that maintain or improve their status quo or future prospects and oppose policy proposals that put them at a disadvantage. Businesses (business associations

and companies) and non-governmental or civil society organizations (NGO, CSO) are two important groups of stakeholders that feature prominently in research on policy preferences, lobbying behavior, and interest group coalition formation (Abel and Mertens 2023; Ingold 2011; Ingold and Fischer 2014; Ingold et al. 2017).

Business and industry stakeholders generally prioritize policies that are efficient and feasible in terms of cost-effectiveness, predictability, and administrative simplicity. They tend to favor policies that minimize compliance costs and regulatory uncertainty (Shahab et al. 2019; De Brucker et al. 2013). For businesses in the forest industry, research indicates a general preference for “softer” instruments with little or no state involvement like voluntary and informational instruments (Dür et al. 2015; Ohmura and Creutzburg 2021). Compared to NGOs, they are also more in favor of keeping the status quo rather than supporting policy change (Dür et al. 2015). However, regulatory instruments are still seen as important when they do not restrict businesses directly, but rather protect forests from further external demand from other sectors (Danley 2019; Ohmura and Creutzburg 2021). This is in line with the findings from Leipold et al. (2016), where in the context of EU timber legislation industry stakeholders tended to support regulations when they protect them from international competition. In the case of the EUTR, businesses valued the regulation with regards to fostering the “green image” of products and establishing a “level-playing-field,” protecting sustainably operating companies from those who might generate a cost advantage by not complying with environmental standards (Leipold et al. 2016; Schwer and Sotirov 2014). In some instances, businesses and (environmental) NGOs form strategic alliances to achieve common policy goals. These alliances are referred to as “strange bedfellowships” (Abel and Mertens 2023; Beyers and De Bruycker 2018). Considering the above-mentioned studies, it appears that business stakeholders favor soft or no policy instruments at all, unless they benefit from those policies in terms of realizing competitive advantages, such as market protection from international competitors, or if they contribute to fair and equal market conditions in the form of a level playing field. This can nonetheless lead to business stakeholders supporting environmental policies if they happen to support companies in achieving corporate goals. Environmental NGOs more often than corporate stakeholders support policy change and aim to harmonize regulatory standards across Europe (Dür et al. 2015). They tend to promote strict policies that are seen as contributing to achieving environmental goals effectively and protect forests from further exploitation (Leipold et al. 2016). Usually, they emphasize effectiveness, sustainability, and equity, valuing long-term environmental impact, intergenerational fairness, and coherent policy frameworks (De Brucker et al. 2013; Sandin et al. 2019). In the context of the European Union Emissions Trading Scheme, environmental advocacy groups, consisting of both businesses and NGOs, were in favor of mitigation measures, but mostly lobbied for stricter regulation concerning target sectors, allocation modalities, and policy ambitiousness (Abel and Mertens 2023). Environmental NGOs on the other hand must be committed to their members’ and donors’ interests in nature conservation (Beyers and De Bruycker 2018) and thus tend to favor effective environmental policies with a high degree of policy intensity.

Civil society actors include citizens and representative organizations, such as consumer associations. In the context of EU legislation on forest-risk commodities, civil society organizations have supported more comprehensive and stringent regulation, while businesses have pushed for less stringency and enforceability (Schilling-Vacaflor and Lenschow 2023). In general, civil society actors tend to stress equity, acceptability, and legitimacy, emphasizing inclusive participation, local fairness, and distributive justice when it comes to policies (De Brucker et al. 2013; Sherman and Ford 2014; Renn 2015). Citizens may support protectionist measures for sectors they consider “weak,” in order to protect them from international competition (Lü et al. 2012; Naoi and Kume 2015). Land users reject bearing a burden that they think should be shared with society at large. They demand to be compensated for their conservation efforts and want autonomy in how and how much to conserve (Doremus 2003). Studies in the field of climate policy also suggest that citizens highly support voluntary and supply-focused policies that set requirements for industry, while market-based instruments like carbon taxes and cap-and-trade are often opposed (Lam 2015; Rhodes et al. 2017; Tobler et al. 2012). Citizens are a very heterogeneous group and tend to reject policies that restrict them, while being supportive regarding policies that put the burden on businesses and policies that benefit disadvantaged groups. In general, the preference for certain policy types is driven by societal awareness and the degree of support for environmental conservation.

Scientific organizations (universities and non-university research institutions) are presumably neutral in the sense that they do not have an intrinsic motivation to attain specific policy goals, making it questionable to even classify them as interest groups (Leifeld and Schneider 2012). Despite the general neutrality of research, different research fields and schools of thinking within research fields can have diverging focal points and perspectives on the same issue, which might lead to diverging policy recommendations. Given the relative objectivity and despite potential discipline bias, we expect no universal preferences for or against certain policy instruments in this stakeholder group. Instead, we expect the science base in general to most likely support policy instruments and mixes that balance environmental effectiveness with socio-economic requirements.

## 2 | Research Design

### 2.1 | Sample Description

Our analyses are based on a survey conducted by the European Commission as part of a public consultation process of the EUDR (European Commission 2020). The survey was conducted from September 03, 2020 until December 10, 2020. The purpose of the consultation was to include stakeholders in the policy process and to consider their inputs on potential EU policy instruments to tackle deforestation and forest degradation associated with EU consumption of agricultural products. The results of the public consultation contributed to an impact assessment and to the subsequent development process of the EUDR. The survey was open to the general public and yielded 1148 partially incomplete responses (European

Commission 2021c). While incomplete responses had just minor methodological implications for the PCA, subsequent regression analyses, which necessitate complete cases, required narrowing down the sample size to 198 observations for later analyses (see Appendix B, Figure A1 on data cleaning and processing). Survey respondents comprised a broad variety of stakeholders, including 816 (71%) EU citizens, 81 (7%) non-governmental organizations, 67 (6%) company/business organizations, 49 (4%) business associations, 42 (4%) non-EU citizens, 37 (3%) academic/research institutions, 12 (1%) public authorities, 11 (1%) environmental organizations, 4 (<1%) trade unions and 31 (3%) others.

Responses of the questionnaire were assigned to a specific stakeholder group, depending on the role the respective respondent indicated in the survey. These stakeholder groups were used in further analyses and encompass the following roles: (i) *Business*, including companies, business organizations, trade unions and business associations, (ii) *NGO*, including non-governmental organizations and environmental organizations, (iii) *Research*, including academia and research institutions, (iv) *Citizen*, including EU and non-EU citizens, and (v) *Other*, including stakeholders that classified themselves as “Other.”

## 2.2 | EUDR Public Consultation Data

The questionnaire of the public consultation survey contained several stakeholder-related questions such as country of origin, organization size, industry sector, knowledge level on deforestation and private commitments to tackle deforestation. Other questions related to the role and contribution of different sectors, commodities, and driving factors of deforestation as well as what kind of forests to prioritize and which obstacles are faced by companies to effectively implement deforestation-free supply chains. In terms of possible policy options, 14 instruments were to be rated on a 5-point Likert scale regarding their suitability to address the issue of deforestation and forest degradation associated with EU consumption, their effect on companies' and public authorities' cost of operation and implementation respectively, their impact on the participant's country of origin, and their effectiveness in terms of halting and reversing EU and global deforestation. The following instruments have been evaluated:

1. A deforestation-free requirement or standard that commodities or products in their product category must comply with to be placed on the EU market (and consequently a prohibition, in line with EU international commitments, of the placing on the market of commodities that do not comply with those standards)
2. Voluntary labeling (e.g., similar to organic labels for organic products)
3. Mandatory labeling (e.g., similar to nutritional information labels on food products)
4. Public national legality verification schemes, prohibited operators list, country carding system and export ban to the EU (a replication, with the necessary adaptations, of the EU legislation in place for illegal, unreported and unregulated (IUU) fishing)

5. Voluntary due diligence
6. Mandatory due diligence
7. Mandatory public certification system
8. Private certification systems, new and the ones already in place in the EU market
9. Build benchmarking or country assessments (e.g., index) showing which countries are exposed to and effectively combat deforestation or forest degradation for information purposes
10. Promotion through trade and investment agreements of trade in legal and sustainable products
11. Mandatory disclosure of information (including corporate non-financial reporting)
12. Development and cooperation assistance to producing countries
13. Consumer information campaigns in the EU
14. Green diplomacy

We used the question related to the suitability evaluation of an instrument as a proxy for the preference of a stakeholder towards that particular instrument. Participants were asked as follows.

From the list below, which measures are the most suitable to address the issue of deforestation and forest degradation associated with EU consumption? Note that some of the measures presented below are complementary and could be combined. Please rate each measure on a scale of 1 to 5, 1 representing not suitable at all, 2 representing somewhat not suitable, 3 representing neutral, 4 representing somewhat suitable, 5 representing completely suitable.

As the survey was open to the public and participation was voluntary, the data is susceptible to self-selection bias (Heckman 1990). All questions were voluntary and some variables contained high amounts of missing values. See Appendix A, Table A1 for a summary statistics table of the whole sample.

## 2.3 | Supplementary Interviews

For complementary qualitative background information on instrument preferences from the most affected stakeholder group, businesses, we conducted interviews with seven representatives from six business associations in Germany. All associations represented industries that are highly affected by the EUDR. Most of the semi-structured interviews were conducted online between April and May 2024 and had a duration of about 45 min. Interviewees were then presented with the same policy alternatives that were the subject of the EUDR consultation process and asked which of these or other alternative solutions would be more or even less in the interests of their respective industry and why.

Mixed-methods approaches can provide a more comprehensive understanding of policy processes by combining the breadth of quantitative data with the contextual depth of qualitative

insights (Dawadi et al. 2021; Oranga et al. 2025). In this study, however, the small number of interviews means that the qualitative component cannot claim representativeness. The interviews mainly serve to contextualize and illustrate findings from the consultation analysis by providing examples of how business actors interpret and rationalize policy instruments. While such triangulation can enrich interpretation and highlight mechanisms underlying quantitative patterns (Dawadi et al. 2021; Oranga et al. 2025), the limited sample size restricts the diversity of perspectives and prevents thematic saturation (Weller et al. 2018). The interview results should therefore be viewed as indicative rather than generalizable insights that complement the quantitative findings.

### 3 | Results

#### 3.1 | Preferences for Individual Instruments and Instrument Correlations

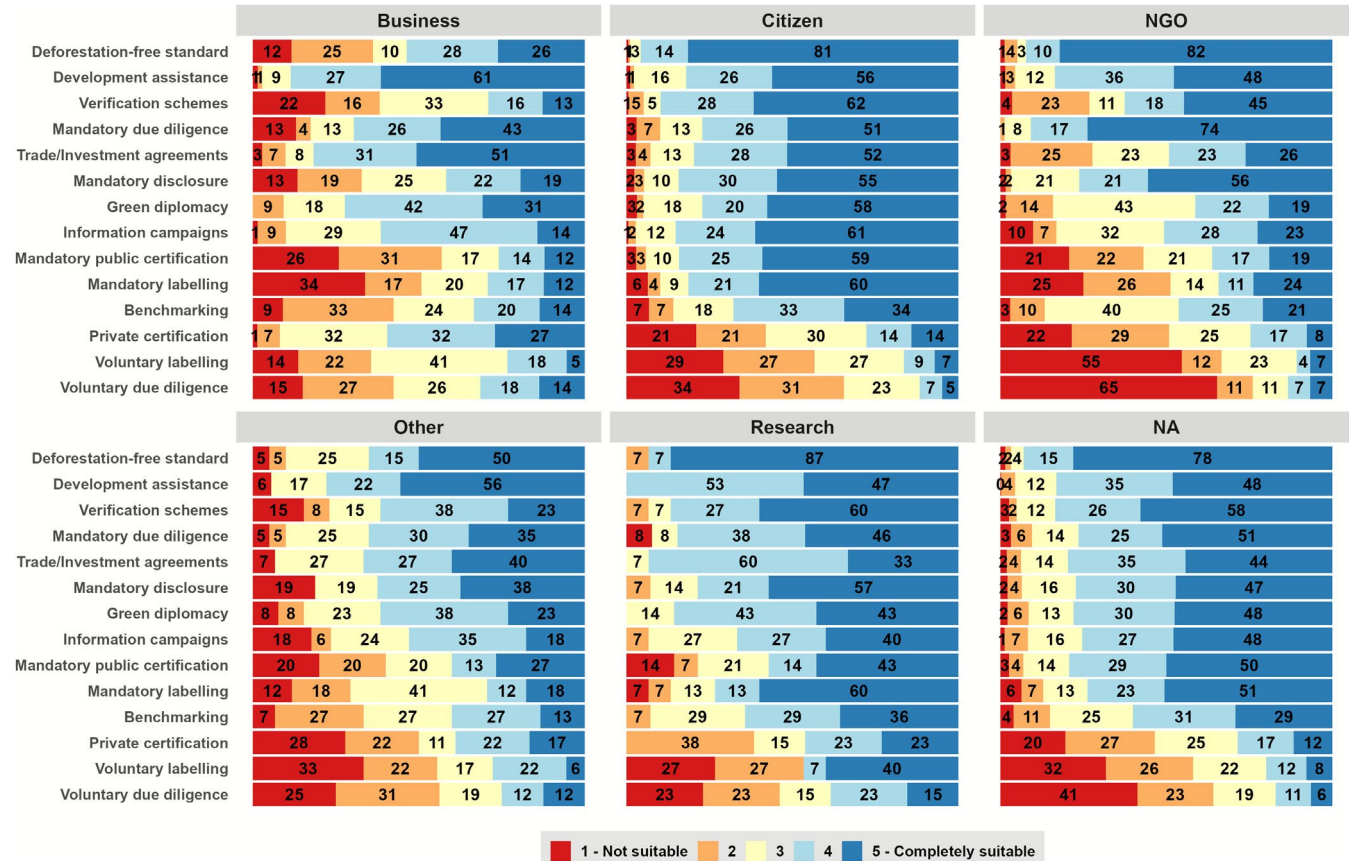
The individual suitability ratings of the 14 policy instrument options were assessed across stakeholder groups. Stakeholders who did not indicate a certain stakeholder category have been classified as NA. The results are presented in terms of the proportion of responses within each suitability category (Figure 1). To further analyze the relationships between these assessments, correlations between the suitability ratings of individual instrument options were calculated and visualized in a heatmap. Positive correlations (in red) indicate that instruments

were perceived as similarly suitable, while negative correlations (in blue) suggest diverging evaluations among respondents (Figure 2).

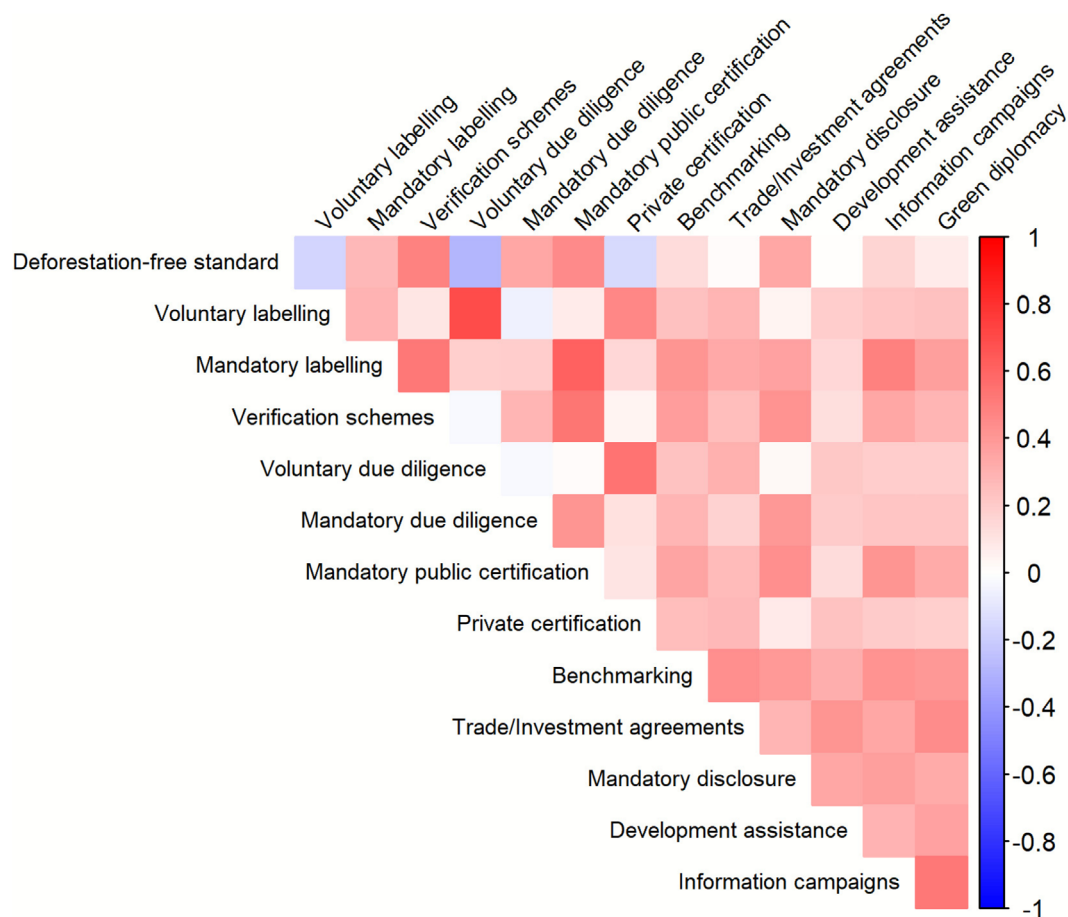
#### 3.2 | Principle Component Analysis (PCA)

We conducted a principal component analysis (PCA) to identify patterns that separate groups of instruments in terms of how stakeholders evaluate their suitability (Table 3). We used the 14 policy instrument options as items and applied oblique rotation (oblim). All necessary assumptions and conditions for conducting a PCA were met: The Kaiser-Meyer-Olkin measure verified the sampling adequacy of the analysis  $KMO = 0.85$  (“meritorious” according to Kaiser (1974)), and all individual KMO values were  $> 0.72$  for each item, which is well above the acceptable limit of 0.5. Bartlett’s test of sphericity, Chi-square (91) = 5840,  $p < 0.001$ , indicated that correlations between items were sufficiently large for PCA. An initial analysis was run to obtain eigenvalues for each component in the data. Three components had eigenvalues over Kaiser’s criterion of 1 and four had eigenvalues over Jolliffe’s criterion of 0.7, explaining 59% and 65% of the variance, respectively. The scree plot showed an inflection that rather justified the extraction of four factors; hence considering Jolliffe’s criterion and the graphical analysis, four components were retained in the final analysis.

Table 3 shows the factor loadings of the PCA after rotation as well as eigenvalues and variance explained by each



**FIGURE 1** | Suitability assessment of each instrument option by stakeholder group. Values represent rounded proportions.



**FIGURE 2** | Heatmap for the correlations between suitability ratings of individual instrument options.

component. Factor loadings above the cut-off value of 0.3 were considered. They represent the relationship between the policy instruments and the four components. The items that cluster on the same components suggest that the first component represents mainly mandatory policy instruments for example, mandatory labeling and mandatory public certification systems; the second component represents mainly international policies for example, green diplomacy and development and cooperation assistance; the third component represents voluntary policies for example, voluntary due diligence and voluntary labeling; and the fourth component represents instruments close to the EUDR solution, comprising mandatory due diligence together with deforestation-free requirements and mandatory disclosure of information loading on this factor.

### 3.3 | Regression Analyses

Factor scores from the PCA have been extracted to further analyze differences in the relationship between stakeholder groups and the components via linear regressions (Tables 4–7). In addition to the stakeholder group variable, control variables have been added to the analyses: *Policy core belief* represents a participant's belief that an EU-level intervention on EU consumption of goods would reduce global deforestation and forest degradation, measured on a 5-point scale from “very little” to “very much”. *Knowledge level* indicates participants'

self-assessment on how they rate their level of knowledge of deforestation and forest degradation and associated trade, measured on a 5-point scale from “I have not heard from it” to “I am recognized as an expert”. Furthermore, the *main sector* and *country of origin* most represented in the survey have been included.

Linear regressions were conducted for each component. Variables were added stepwise based on importance and number of missing values. The high number of missing values in the variable “Stakeholder group” caused the number of observations to shrink to  $n = 198$  in step four. To test if the fluctuation in sample size between steps affected the outcome of the regression models (Smith 2018), all regressions were rerun using only complete cases (see Appendix B, Figure A1 for the data cleaning process). No major differences occurred and the results discussed in the following of this article refer to models that were run with complete cases only ( $n = 198$ ). The final sample is composed as follows: 36 Businesses, 107 Citizens, 37 NGOs, 12 Research Organizations, and 6 Others. An overview of the organizations whose responses were included in the linear regression models can be found in Appendix C, Table A2. The results of these regressions are summarized in Tables 4–7. For our analyses we focus on model five, which encompasses all variables and explains more than 51% of variance. We look at differences between stakeholder groups, using the Business group as a reference. Figure 3 shows a plot of the coefficients for all four components (full models) with standardized coefficients

**TABLE 3** | Summary of PCA results for the suitability evaluation of 14 policy instrument alternatives to tackle deforestation and forest degradation associated with EU consumption ( $N=1148$ ). Factor loadings represent the relationship between the policy instruments and the four components. Eigenvalues above the cut-off value of 0.3 are depicted in bold.

| Item                                              | Oblim rotated factor loadings |                        |                    |               |
|---------------------------------------------------|-------------------------------|------------------------|--------------------|---------------|
|                                                   | Mandatory policies            | International policies | Voluntary policies | EUDR solution |
| Mandatory labeling                                | <b>0.79</b>                   | 0.14                   | 0.17               | −0.17         |
| Public national legality verification schemes     | <b>0.76</b>                   | 0.04                   | −0.02              | 0.11          |
| Mandatory public certification system             | <b>0.75</b>                   | 0.04                   | 0.04               | 0.20          |
| Deforestation-free requirement or standard        | <b>0.61</b>                   | −0.19                  | −0.24              | <b>0.38</b>   |
| Development and cooperation assistance            | −0.29                         | <b>0.76</b>            | 0.03               | 0.29          |
| Green diplomacy                                   | 0.18                          | <b>0.75</b>            | −0.05              | −0.14         |
| Promotion through trade and investment agreements | 0.05                          | <b>0.66</b>            | 0.15               | 0.00          |
| Consumer information campaigns                    | <b>0.41</b>                   | <b>0.56</b>            | 0.01               | −0.16         |
| Build benchmarking or country assessment          | 0.29                          | <b>0.46</b>            | 0.17               | 0.12          |
| Voluntary due diligence                           | −0.04                         | 0.02                   | <b>0.88</b>        | −0.04         |
| Voluntary labeling                                | 0.15                          | 0.00                   | <b>0.82</b>        | −0.16         |
| Private certification systems                     | −0.05                         | −0.03                  | <b>0.82</b>        | 0.28          |
| Mandatory due diligence                           | 0.15                          | 0.08                   | 0.05               | <b>0.79</b>   |
| Mandatory disclosure of information               | 0.30                          | <b>0.37</b>            | −0.08              | <b>0.44</b>   |
| Eigenvalues                                       | 2.89                          | 2.54                   | 2.34               | 1.40          |
| Variance explained                                | 21%                           | 18%                    | 17%                | 10%           |

and robust standard errors for the variables “knowledge level” and “policy core belief.”

stakeholder group in the policy development process and implementation phase.

### 3.4 | Supplementary Interviews

Our interviews with representatives of German business associations revealed further insights on the position of business stakeholders. When asked for policy alternatives, some business associations favored international policies such as promotion through trade and investment agreements of trade in legal and sustainable products. Voluntary instruments produced mixed reactions. For example, while some association representatives valued the benefits of private certification, consumer information campaigns were seen as rather ineffective, difficult to assess and too costly. Mandatory instruments were seen as effective, but often evaluated as too high a burden for companies. It became apparent that the individual policy instrument plays a less important role for the degree of support, but the details of how a policy is designed, implemented and costs are distributed among actors can lead to rejection or opposition from a

## 4 | Discussion

We explored the stated suitability for each single instrument by stakeholder group and the correlation between suitability ratings. The suitability assessments depicted in Figure 1 show that a “Deforestation-free requirement or standard that commodities or products in their product category must comply with to be placed on the EU market” is considered one of the most suitable policy instruments by almost all stakeholder groups, with the exception of businesses, who see this instrument as rather unsuitable. The main instrument later selected for the EUDR, “Mandatory Due Diligence,” is still among the instruments considered highly suitable across stakeholder groups, but is particularly favored by NGOs. Other instruments with predominantly mandatory characteristics, such as “Mandatory labeling” or “Mandatory disclosure of information” are considered rather unsuitable by businesses, in contrast to rather high suitability

**TABLE 4** | Linear regression results for the mandatory policies component.

|                                                          | Mandatory policies  |                      |                      |                      |                     |
|----------------------------------------------------------|---------------------|----------------------|----------------------|----------------------|---------------------|
|                                                          | (1)                 | (2)                  | (3)                  | (4)                  | (5)                 |
| Policy core belief                                       | 0.621***<br>(0.113) | 0.588***<br>(0.100)  | 0.563***<br>(0.097)  | 0.457***<br>(0.102)  | 0.452***<br>(0.106) |
| Knowledge level                                          |                     | −0.595***<br>(0.075) | −0.576***<br>(0.080) | −0.264***<br>(0.099) | −0.231**<br>(0.103) |
| Main sector (reference: Biodiversity and/or environment) |                     |                      |                      |                      |                     |
| Climate change                                           |                     |                      | 0.423**<br>(0.206)   | 0.440*<br>(0.243)    | 0.404<br>(0.250)    |
| Consumption (general) and/or consumer interests          |                     |                      | 0.139<br>(0.436)     | 0.202<br>(0.338)     | 0.137<br>(0.369)    |
| Education                                                |                     |                      | 0.182<br>(0.239)     | 0.048<br>(0.177)     | −0.024<br>(0.198)   |
| Scientific research                                      |                     |                      | −0.017<br>(0.562)    | −0.219<br>(0.515)    | −0.327<br>(0.527)   |
| Services (general)                                       |                     |                      | 0.330<br>(0.221)     | 0.232<br>(0.208)     | 0.143<br>(0.210)    |
| Other                                                    |                     |                      | −0.185<br>(0.148)    | −0.162<br>(0.156)    | −0.211<br>(0.161)   |
| Stakeholder group (reference: Business)                  |                     |                      |                      |                      |                     |
| Citizen                                                  |                     |                      |                      | 1.003***<br>(0.243)  | 0.849***<br>(0.242) |
| NGO                                                      |                     |                      |                      | 0.085<br>(0.274)     | 0.026<br>(0.265)    |
| Other                                                    |                     |                      |                      | 0.150<br>(0.328)     | −0.076<br>(0.345)   |
| Research                                                 |                     |                      |                      | 1.086***<br>(0.317)  | 0.917***<br>(0.347) |
| Country (reference: Germany)                             |                     |                      |                      |                      |                     |
| Belgium                                                  |                     |                      |                      |                      | −0.110<br>(0.380)   |
| Brazil                                                   |                     |                      |                      |                      | 0.174<br>(0.398)    |
| France                                                   |                     |                      |                      |                      | −0.008<br>(0.396)   |
| Italy                                                    |                     |                      |                      |                      | 0.237<br>(0.313)    |
| Netherlands                                              |                     |                      |                      |                      | −0.373<br>(0.406)   |

(Continues)

TABLE 4 | (Continued)

|                | Mandatory policies   |                   |                   |                      |                      |
|----------------|----------------------|-------------------|-------------------|----------------------|----------------------|
|                | (1)                  | (2)               | (3)               | (4)                  | (5)                  |
| Sweden         |                      |                   |                   |                      | 0.346<br>(0.521)     |
| United Kingdom |                      |                   |                   |                      | −0.237<br>(0.540)    |
| United States  |                      |                   |                   |                      | −0.349<br>(0.344)    |
| Other          |                      |                   |                   |                      | 0.284<br>(0.315)     |
| Constant       | −2.935***<br>(0.512) | −0.535<br>(0.584) | −0.492<br>(0.600) | −1.838***<br>(0.593) | −1.914***<br>(0.679) |
| Observations   | 198                  | 198               | 198               | 198                  | 198                  |
| R <sup>2</sup> | 0.183                | 0.375             | 0.393             | 0.487                | 0.513                |

Note: \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

ratings given by other stakeholder groups to these instruments. These suitability ratings reflect the underlying strategic orientation of the stakeholder groups. As discussed earlier, business stakeholders tend to emphasize efficiency, feasibility, and market predictability, and therefore rather oppose instruments that impose direct compliance obligations or might increase administrative costs. Their lower ratings for mandatory instruments such as “Deforestation-free requirement or standard” are consistent with this rationale. By contrast, NGOs, citizens, and research institutions, whose preferences are rather shaped by environmental effectiveness, equity, and long-term sustainability, view stringent regulatory measures as essential to achieving deforestation and biodiversity goals. It also becomes apparent that three instruments with an explicitly low level of policy intensity, namely “Private certification systems, new and the ones already in place in the EU market,” “Voluntary labeling” and “Voluntary due diligence” have particularly low suitability ratings across stakeholder groups. This finding suggests a general perception that voluntary or self-regulatory measures are insufficient to address deforestation effectively and do not contribute to the strategic interests of any stakeholder group. Even business stakeholders, who generally prefer low-intensity and flexible approaches, appear to have little confidence in such instruments. Our interviews confirm that some business stakeholders are concerned about limited enforceability, inconsistent implementation, and questionable effectiveness of these instruments in reducing deforestation risks.

Correlations between individual instruments in terms of suitability provide indications of possible combinations of instruments that are supported or rejected by stakeholders. However, given how the question for the suitability assessment was formulated in the public consultation, it is not possible to differentiate whether a simultaneously high rating of two instruments reflects whether stakeholders consider these instruments as substitutes or complements. Negative correlations appear between a “Deforestation

standard,” the instrument option with the highest suitability rating, and the three instrument options with the lowest suitability rankings, which are “Private certification systems,” “Voluntary labeling,” and “Voluntary due diligence”. There are highly positive correlations between “Voluntary labeling” and “Voluntary due diligence,” two instruments with low degrees of policy intensity and low suitability ratings. “Mandatory due diligence” shows intermediate correlations with almost all other instrument options, with the exception of “Voluntary due diligence” and “Voluntary labeling,” where correlation coefficients are close to zero.

The results of the PCA show that different types of anti-deforestation policy instruments covered in the EUDR consultation process are evaluated in distinct patterns by stakeholders. In fact, the instruments can be grouped based on stakeholder preferences. Differences in the nature of instrument types and stakeholder positions towards mandatory and voluntary types of instruments have been discussed in the NEPI literature, distinguishing between “command- and-control” regulations and “new” environmental policy instruments (Gunningham et al. 1998; Jordan et al. 2005; Wurzel et al. 2013, 2019). Differences in the suitability assessment of instrument types in these two categories might be based on differences in expected policy intensity for certain stakeholder groups. Whereas “command-and-control” regulations and “new” environmental policy instruments affect stakeholders more directly in the sense that stakeholders are addressed by these policies and require more or less explicit behavioral changes from them, international policies differ in that they affect stakeholders just indirectly or on a higher level of abstraction via intergovernmental agreements. Consumer information campaigns load on both Mandatory Instruments and International Instruments but not on Voluntary Instruments, which might be an indicator for the supporting role of consumer information campaigns for other policy measures, rather than being a stand-alone intervention. A special case is the component representing instruments close

**TABLE 5** | Linear regression results for the international policies component.

|                                                          | International policies |                      |                    |                    |                     |
|----------------------------------------------------------|------------------------|----------------------|--------------------|--------------------|---------------------|
|                                                          | (1)                    | (2)                  | (3)                | (4)                | (5)                 |
| Policy core belief                                       | 0.024<br>(0.109)       | 0.011<br>(0.110)     | 0.029<br>(0.108)   | 0.062<br>(0.105)   | 0.102<br>(0.114)    |
| Knowledge level                                          |                        | −0.227***<br>(0.082) | −0.170*<br>(0.099) | −0.058<br>(0.106)  | −0.013<br>(0.106)   |
| Main sector (reference: Biodiversity and/or environment) |                        |                      |                    |                    |                     |
| Climate change                                           |                        |                      | 0.090<br>(0.251)   | 0.085<br>(0.281)   | 0.159<br>(0.279)    |
| Consumption (general) and/or consumer interests          |                        |                      | 0.206<br>(0.361)   | 0.178<br>(0.343)   | 0.070<br>(0.357)    |
| Education                                                |                        |                      | 0.204<br>(0.230)   | 0.131<br>(0.229)   | 0.042<br>(0.262)    |
| Scientific research                                      |                        |                      | 0.029<br>(0.642)   | −0.083<br>(0.642)  | −0.303<br>(0.612)   |
| Services (general)                                       |                        |                      | 0.548<br>(0.397)   | 0.473<br>(0.403)   | 0.245<br>(0.407)    |
| Other                                                    |                        |                      | 0.170<br>(0.190)   | 0.070<br>(0.200)   | −0.047<br>(0.195)   |
| Stakeholder group (reference: Business)                  |                        |                      |                    |                    |                     |
| Citizen                                                  |                        |                      |                    | −0.007<br>(0.214)  | −0.250<br>(0.232)   |
| NGO                                                      |                        |                      |                    | −0.515*<br>(0.263) | −0.711**<br>(0.277) |
| Other                                                    |                        |                      |                    | −0.881<br>(0.621)  | −1.064**<br>(0.530) |
| Research                                                 |                        |                      |                    | 0.059<br>(0.239)   | −0.114<br>(0.309)   |
| Country (reference: Germany)                             |                        |                      |                    |                    |                     |
| Belgium                                                  |                        |                      |                    |                    | −0.373<br>(0.331)   |
| Brazil                                                   |                        |                      |                    |                    | −0.371<br>(0.494)   |
| France                                                   |                        |                      |                    |                    | −0.417<br>(0.399)   |
| Italy                                                    |                        |                      |                    |                    | 0.221<br>(0.288)    |
| Netherlands                                              |                        |                      |                    |                    | −0.724<br>(0.532)   |

(Continues)

TABLE 5 | (Continued)

|                | International policies |                  |                  |                   |                   |
|----------------|------------------------|------------------|------------------|-------------------|-------------------|
|                | (1)                    | (2)              | (3)              | (4)               | (5)               |
| Sweden         |                        |                  |                  |                   | −0.584<br>(0.356) |
| United Kingdom |                        |                  |                  |                   | −0.461<br>(0.615) |
| United States  |                        |                  |                  |                   | −0.010<br>(0.386) |
| Other          |                        |                  |                  |                   | 0.084<br>(0.277)  |
| Constant       | −0.127<br>(0.492)      | 0.791<br>(0.620) | 0.407<br>(0.694) | −0.001<br>(0.683) | −0.054<br>(0.693) |
| Observations   | 198                    | 198              | 198              | 198               | 198               |
| R <sup>2</sup> | 0.0004                 | 0.039            | 0.049            | 0.091             | 0.159             |

Note: \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

to the EUDR Solution, which also consists entirely of mandatory instruments loading on that component, with “deforestation free requirement or standard” loading on both EUDR Solution and Mandatory Instruments. This might be a result of the policy process and the context in which the consultation process took place. A mandatory due diligence solution might have already emerged as a likely or prioritized solution, leading to a distinct evaluation pattern among stakeholders for these particular instruments under discussion.

When relating the empirically derived components to existing classifications of policy instruments, several overlaps and extensions become apparent. The group of *mandatory policies* corresponds closely to traditional *command-and-control* or *regulatory* instruments in the NEPI framework and to the *disincentive-based* category in Börner and Vosti’s (2013) typology, as both rely on binding rules and sanctions to change actor behavior. The *voluntary policies* component aligns with *informational* or *self-regulatory* NEPIs and with *incentive-based* instruments in Börner and Vosti’s categorization, where compliance depends on voluntary engagement and reputational or market incentives rather than enforcement. The *international policies* component shares characteristics with *enabling measures* in Börner and Vosti’s framework, as these instruments primarily aim to create supportive conditions such as cooperation, knowledge transfer, or financial assistance. Finally, the grouping of instruments representing the *EUDR solution* indicates the emergence of a hybrid form that combines elements of regulatory and informational approaches. The overlaps between our findings and established classifications suggest that existing typologies are largely robust, though they can be further enriched by considering the dynamic interactions between policy instruments and stakeholder perspectives.

Linear regression results for the instrument group of mandatory policies (Table 4) show that research organizations (beta = 0.917,  $p < 0.01$ ) and citizens (beta = 0.849,  $p < 0.01$ )

are significantly more in favor of this instrument category than businesses. This is not the case for NGOs (beta = 0.026,  $p > 0.1$ ). A possible explanation for this result could be the emergence of pro-environment alliances between NGOs and businesses in the development process of the EUDR, as analyzed by Berning and Sotirov (2024). While NGOs advocate mandatory instruments for their effectiveness in reaching environmental goals, businesses may support selected mandatory instruments when they promise to limit market access for competitors from non-EU markets.

As for international policies (Table 5), NGOs (beta = −0.711,  $p < 0.05$ ) and “other” stakeholders (beta = −1.064,  $p < 0.05$ ) evaluate this group of policies significantly less suitable compared to businesses. Distributional dimensions like spatial or temporal factors provide a possible explanation for this result: Businesses could prefer international policies when they shift responsibilities away from single companies to governments and affect them less directly and less immediately than mandatory policies. This is also in line with findings from our interviews, where associations characterize international policies, like development and cooperation assistance to producing countries, as more adequate measures than the EUDR in its current form.

Regarding voluntary policies (Table 6), both citizens (beta = −0.952,  $p < 0.01$ ) and NGOs (beta = −0.549,  $p < 0.05$ ) are significantly less in favor of this instrument type than businesses. This appears plausible since these instruments have little leverage on business practices unless companies comply voluntarily. Since these measures have a low level of policy intensity, and they are likely to appear less suitable for environmental NGOs and well-informed citizens.

In the case of the EUDR solution (Table 7), all other stakeholder groups evaluate this group of instruments as more suitable than businesses, but the result is only slightly significant for research organizations (beta = 0.582,  $p < 0.1$ ), indicating

**TABLE 6** | Linear regression results for the voluntary policies component.

|                                                          | Voluntary policies   |                      |                      |                      |                      |
|----------------------------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                                                          | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  |
| Policy core belief                                       | −0.320***<br>(0.085) | −0.328***<br>(0.084) | −0.265***<br>(0.083) | −0.127<br>(0.089)    | −0.131<br>(0.090)    |
| Knowledge level                                          |                      | −0.157**<br>(0.076)  | −0.048<br>(0.082)    | −0.229**<br>(0.091)  | −0.208**<br>(0.095)  |
| Main sector (reference: Biodiversity and/or environment) |                      |                      |                      |                      |                      |
| Climate change                                           |                      |                      | 0.501*<br>(0.292)    | 0.573**<br>(0.280)   | 0.664**<br>(0.289)   |
| Consumption (general) and/or consumer interests          |                      |                      | 0.177<br>(0.338)     | 0.190<br>(0.265)     | 0.129<br>(0.249)     |
| Education                                                |                      |                      | 0.160<br>(0.291)     | 0.200<br>(0.267)     | 0.207<br>(0.270)     |
| Scientific research                                      |                      |                      | −0.484<br>(0.487)    | −0.332<br>(0.512)    | −0.398<br>(0.557)    |
| Services (general)                                       |                      |                      | 0.784*<br>(0.409)    | 0.875**<br>(0.424)   | 0.850**<br>(0.415)   |
| Other                                                    |                      |                      | 0.454***<br>(0.163)  | 0.433***<br>(0.161)  | 0.419**<br>(0.164)   |
| Stakeholder group (reference: Business)                  |                      |                      |                      |                      |                      |
| Citizen                                                  |                      |                      |                      | −0.815***<br>(0.188) | −0.952***<br>(0.216) |
| NGO                                                      |                      |                      |                      | −0.487**<br>(0.235)  | −0.549**<br>(0.236)  |
| Other                                                    |                      |                      |                      | −0.514<br>(0.455)    | −0.705<br>(0.476)    |
| Research                                                 |                      |                      |                      | 0.064<br>(0.385)     | −0.050<br>(0.397)    |
| Country (reference: Germany)                             |                      |                      |                      |                      |                      |
| Belgium                                                  |                      |                      |                      |                      | −0.335<br>(0.332)    |
| Brazil                                                   |                      |                      |                      |                      | 0.031<br>(0.464)     |
| France                                                   |                      |                      |                      |                      | −0.040<br>(0.340)    |
| Italy                                                    |                      |                      |                      |                      | 0.068<br>(0.305)     |
| Netherlands                                              |                      |                      |                      |                      | −0.037<br>(0.414)    |

(Continues)

TABLE 6 | (Continued)

|                | Voluntary policies  |                     |                    |                     |                     |
|----------------|---------------------|---------------------|--------------------|---------------------|---------------------|
|                | (1)                 | (2)                 | (3)                | (4)                 | (5)                 |
| Sweden         |                     |                     |                    |                     | −0.055<br>(0.353)   |
| United Kingdom |                     |                     |                    |                     | −0.447<br>(0.400)   |
| United States  |                     |                     |                    |                     | −0.233<br>(0.373)   |
| Other          |                     |                     |                    |                     | 0.269<br>(0.300)    |
| Constant       | 1.509***<br>(0.375) | 2.142***<br>(0.485) | 1.257**<br>(0.506) | 1.884***<br>(0.507) | 1.898***<br>(0.604) |
| Observations   | 198                 | 198                 | 198                | 198                 | 198                 |
| R <sup>2</sup> | 0.071               | 0.090               | 0.144              | 0.220               | 0.255               |

Note: \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

a rather broad consent among stakeholders regarding the instruments in this category. The broad support of the EUDR as a mandatory due diligence regulation was reflected in strong supportive coalitions of businesses and NGOs, with only weak opposition. Berning and Sotirov (2024) explain this phenomenon with the Baptist & Bootlegger Theory, which holds that coalitions between policy actors with different moral values can enable policy change when these actors pragmatically align their advocacy efforts (Yandle et al. 2008). In the development process of the EUDR “specific business actors, such as multinational and EU companies from the agricultural and food sectors and their associations (‘Bootleggers’), pursued strategic business-oriented interests. These business actors sought opportunities to secure market access, remove or reduce disadvantages from cheaper competitors on the market, secure legal certainty, and reap reputational benefits or level playing fields. Supported by mixed motivation-driven political decision makers, certifiers and consultants (‘Televangelists’), they found common ground with environmental protection- and social justice-oriented (E)NGOs and CSOs (‘Baptists’).” (Berning and Sotirov 2024, 12).

Regarding the control variables, it appears that a strong belief in EU interventions (“policy core belief”) is associated with the support of mandatory policies ( $\beta = 0.452$ ,  $p < 0.01$ ) and the EUDR solution ( $\beta = 0.522$ ,  $p < 0.01$ ). Stakeholders claiming to be knowledgeable about deforestation (“knowledge level”) oppose mandatory policies ( $\beta = -0.231$ ,  $p < 0.05$ ) and voluntary policies ( $\beta = -0.208$ ,  $p < 0.05$ ), but support the EUDR solution ( $\beta = 0.522$ ,  $p < 0.01$ ). This again emphasizes the strong support of the EUDR with mandatory due diligence as the central measure to counteract deforestation and forest degradation. With little exceptions, the primary sector plays a minor role. The same holds true for the country of origin, with the exception of Brazil being significantly in opposition to the EUDR solution ( $\beta = -1.125$ ,  $p < 0.01$ ) compared to Germany.

## 5 | Conclusion

Policy instrument preferences of stakeholders are known to affect the outcomes of the policy formulation and implementation process. Our research revealed how stakeholder preferences align in favor of or opposition to specific policy instruments and instrument groups. Instrument preferences are shaped by economic and distributional factors that lead to diverging evaluation criteria across stakeholder groups. These preferences reflect strategic interests such as individual (economic) or idealistic (environmental) goals that stakeholders aspire to have included in policy solutions. Given the rising attention to the topics of deforestation and associated biodiversity loss in both society and academia, the goal of this study was to contribute to a better understanding of stakeholder preferences in these policy domains. Using the policy process of the EUDR as a highly relevant case study, we mapped stakeholder preferences for 14 different policy options and explored stakeholder preferences for specific policy instruments and instrument mixes. First, we looked at stakeholder preferences for individual instruments and correlations between suitability ratings of these instruments. A “Deforestation-free requirement or standard” was the most favored instrument across stakeholder groups with the exception of businesses. This instrument correlated negatively with the least supported instruments which have a low level of policy intensity in common, such as “voluntary due diligence” and “voluntary labeling.” We conducted a PCA and identified four different groups of instruments that stakeholders evaluate in a distinct way: (i) mandatory policies, (ii) international policies, (iii) voluntary policies and (iv) policies reflecting the current EUDR solution. Partly, these instrument groups are in line with common classification systems, such as the usual distinction between “command-and-control” instruments and NEPI (Gunningham et al. 1998; Jordan et al. 2005; Wurzel et al. 2013, 2019), which is reflected by the categories of mandatory versus voluntary instruments. We see the further distinction in international policies

**TABLE 7** | Linear regression results for the EUDR solution component.

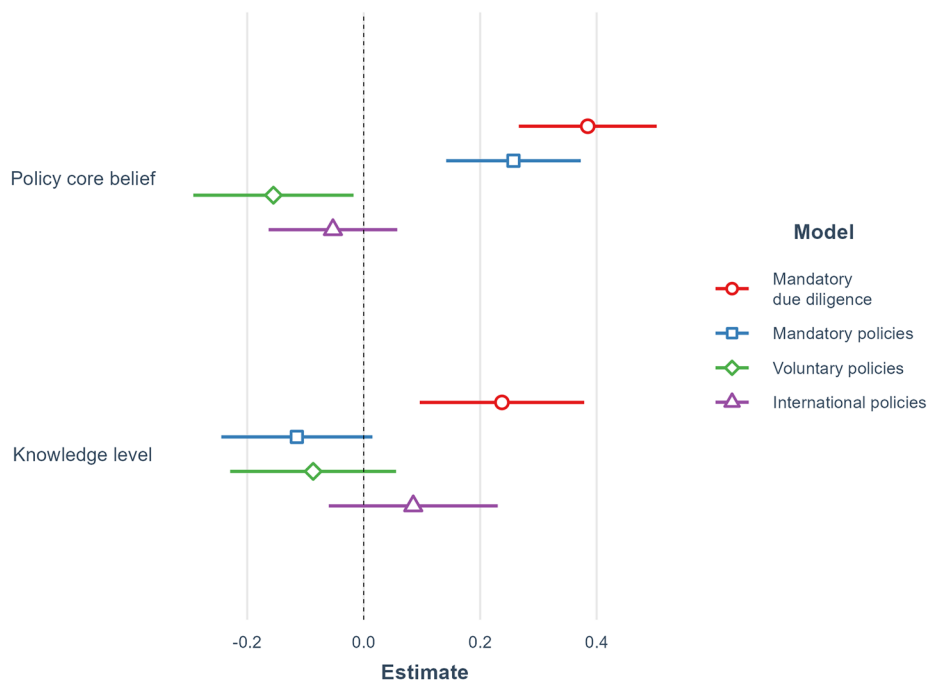
|                                                          | EUDR solution       |                     |                     |                     |                      |
|----------------------------------------------------------|---------------------|---------------------|---------------------|---------------------|----------------------|
|                                                          | (1)                 | (2)                 | (3)                 | (4)                 | (5)                  |
| Policy core belief                                       | 0.592***<br>(0.090) | 0.607***<br>(0.093) | 0.550***<br>(0.084) | 0.494***<br>(0.094) | 0.522***<br>(0.092)  |
| Knowledge level                                          |                     | 0.266***<br>(0.066) | 0.199**<br>(0.078)  | 0.187**<br>(0.088)  | 0.189**<br>(0.090)   |
| Main sector (reference: Biodiversity and/or environment) |                     |                     |                     |                     |                      |
| Climate change                                           |                     |                     | −0.011<br>(0.241)   | −0.015<br>(0.234)   | −0.092<br>(0.212)    |
| Consumption (general) and/or consumer interests          |                     |                     | −0.353<br>(0.285)   | −0.331<br>(0.294)   | −0.195<br>(0.318)    |
| Education                                                |                     |                     | −0.174<br>(0.183)   | −0.146<br>(0.181)   | −0.201<br>(0.195)    |
| Scientific research                                      |                     |                     | −0.286<br>(0.585)   | −0.239<br>(0.571)   | −0.277<br>(0.588)    |
| Services (general)                                       |                     |                     | 0.073<br>(0.258)    | 0.116<br>(0.253)    | 0.089<br>(0.259)     |
| Other                                                    |                     |                     | −0.410**<br>(0.168) | −0.341**<br>(0.167) | −0.374**<br>(0.159)  |
| Stakeholder group (reference: Business)                  |                     |                     |                     |                     |                      |
| Citizen                                                  |                     |                     |                     | 0.161<br>(0.235)    | 0.219<br>(0.245)     |
| NGO                                                      |                     |                     |                     | 0.397<br>(0.247)    | 0.345<br>(0.238)     |
| Other                                                    |                     |                     |                     | 0.040<br>(0.501)    | 0.168<br>(0.388)     |
| Research                                                 |                     |                     |                     | 0.153<br>(0.268)    | 0.582*<br>(0.325)    |
| Country (reference: Germany)                             |                     |                     |                     |                     |                      |
| Belgium                                                  |                     |                     |                     |                     | 0.288<br>(0.255)     |
| Brazil                                                   |                     |                     |                     |                     | −1.125***<br>(0.421) |
| France                                                   |                     |                     |                     |                     | −0.046<br>(0.264)    |
| Italy                                                    |                     |                     |                     |                     | −0.048<br>(0.210)    |
| Netherlands                                              |                     |                     |                     |                     | −0.339<br>(0.342)    |

(Continues)

TABLE 7 | (Continued)

|                | EUDR solution        |                      |                      |                      |                      |
|----------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  |
| Sweden         |                      |                      |                      |                      | −0.012<br>(0.364)    |
| United Kingdom |                      |                      |                      |                      | −0.011<br>(0.206)    |
| United States  |                      |                      |                      |                      | 0.440<br>(0.275)     |
| Other          |                      |                      |                      |                      | 0.015<br>(0.215)     |
| Constant       | −2.588***<br>(0.412) | −3.663***<br>(0.518) | −3.018***<br>(0.536) | −2.923***<br>(0.551) | −3.054***<br>(0.546) |
| Observations   | 198                  | 198                  | 198                  | 198                  | 198                  |
| R <sup>2</sup> | 0.221                | 0.272                | 0.301                | 0.312                | 0.382                |

Note: \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .



**FIGURE 3** | Plot of the coefficients for all four components (full models) with standardized coefficients and robust standard errors for the variables “knowledge level” and “policy core belief.”

and instruments actually applied in the EUDR as indicators showing that policy intensity and context factors may be determinants for stakeholder preferences. Policies that do not directly affect stakeholders, such as international instruments, tend to receive more neutral or broadly positive evaluations. A possible explanation is that these instruments impose few immediate obligations and are perceived as cooperative or enabling measures. In contrast, mandatory instruments that entail direct regulatory or compliance requirements are viewed more critically, particularly by business stakeholders who may be concerned about

administrative burdens and economic drawbacks. Voluntary instruments, which involve direct but non-restrictive engagement, receive mixed assessments, generally considered insufficient by NGOs and citizens, yet not strongly supported by businesses either. Finally, instruments closely linked to the ongoing EUDR development process may be shaped by existing alliances, reflecting stakeholders' expectations and positions in current regulatory debates. Our results confirm differences between stakeholder groups towards different instrument groups. However, linear regressions revealed some inconsistencies with

our theory-based conjectures, for example, that businesses will oppose restrictive, mandatory instruments while NGOs will be in favor of them. In reality, strategic, economic or idealistic interests and specific context factors (e.g., effects on competition) may be more relevant indicators for stakeholder preferences towards certain instruments than the stakeholder group itself.

Our mapping of stakeholder preferences provides a basis for anticipating societal support and opposition of instruments and instrument mixes in the anti-deforestation and biodiversity policy domain, but is limited in providing concrete advice on how an effective and efficient EU instrument mix can be achieved. Further research potential arises in the verification and further identification of the specific drivers of instrument preferences within and across stakeholder groups and how diverging stakeholder preferences can be adequately considered in a balanced EU instrument mix to counter deforestation and biodiversity loss, while at the same time being socially acceptable. In addition, future research should quantify the actual impact of stakeholder preferences in shaping the details of a policy. Such insights could contribute to making policy design processes more robust against biases arising from stakeholder advocacy and power imbalances between stakeholder groups and coalitions trying to influence a policy in favor of their interests. Another limitation and associated potential for further research lie in the underrepresentation of respondents from non-EU countries. Especially the perspective of producer countries would contribute to a more holistic understanding of instrument preferences, which may differ between EU and non-EU actors due to differing economic and political goals and national conditions. Expanding the qualitative component to include a larger and more diverse set of interviews would also broaden the range of stakeholder perspectives and allow for greater thematic saturation.

The preference distinctions identified in this study can be of value for policy makers in terms of estimating the societal feasibility and potential advocacy behavior in the course of instrument adaptations in the further development of the EU anti-deforestation and biodiversity instrument mix. Policy makers are usually aware that preferences can vary among stakeholder groups, but we show that the motivations for endorsing or rejecting a certain instrument or instrument group can be complex and must not be reduced to the membership of a stakeholder group.

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## Conflicts of Interest

The authors declare no conflicts of interest.

## Data Availability Statement

The data that support the findings of this study are openly available in documents annexed to contributions at [https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12137-Deforestation-and-forest-degradation-reducing-the-impact-of-products-placed-on-the-EU-market/public-consultation\\_en](https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12137-Deforestation-and-forest-degradation-reducing-the-impact-of-products-placed-on-the-EU-market/public-consultation_en).

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## Appendix A

**TABLE A1** | Summary statistics.

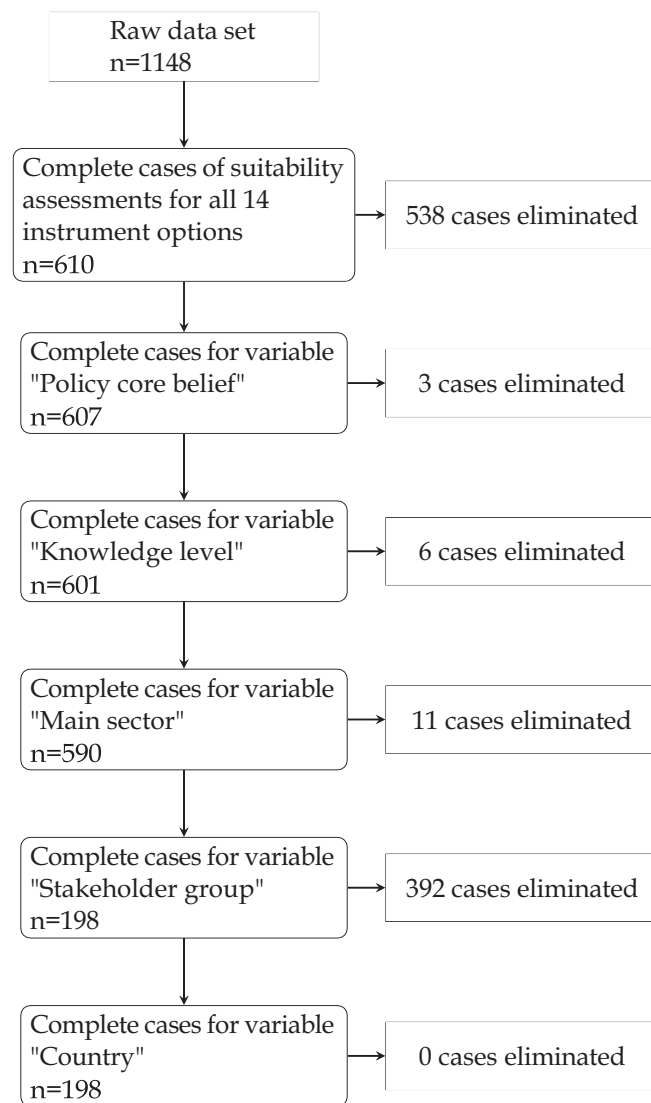
| Variables                                         | N    | Mean | SD   | Min | Pctl. 25 | Pctl. 50 | Pctl. 75 | Max |
|---------------------------------------------------|------|------|------|-----|----------|----------|----------|-----|
| Knowledge level                                   | 1125 | 3.3  | 0.83 | 1   | 3        | 3        | 4        | 5   |
| Policy core belief                                | 1125 | 4.3  | 0.82 | 1   | 4        | 4        | 5        | 5   |
| Deforestation-free requirement or standard        | 1090 | 4.6  | 0.88 | 1   | 5        | 5        | 5        | 5   |
| Voluntary labeling                                | 1068 | 2.4  | 1.3  | 1   | 1        | 2        | 3        | 5   |
| Mandatory labeling                                | 1089 | 3.9  | 1.3  | 1   | 3        | 4        | 5        | 5   |
| Public national legality verification schemes     | 954  | 4.2  | 1.1  | 1   | 4        | 5        | 5        | 5   |
| Voluntary due diligence                           | 966  | 2.2  | 1.3  | 1   | 1        | 2        | 3        | 5   |
| Mandatory due diligence                           | 981  | 4.2  | 1.1  | 1   | 4        | 5        | 5        | 5   |
| Mandatory public certification system             | 962  | 4    | 1.2  | 1   | 3        | 4        | 5        | 5   |
| Private certification systems                     | 943  | 2.8  | 1.3  | 1   | 2        | 3        | 4        | 5   |
| Build benchmarking or country assessments         | 993  | 3.7  | 1.1  | 1   | 3        | 4        | 5        | 5   |
| Promotion through trade and investment agreements | 1024 | 4.1  | 1    | 1   | 4        | 4        | 5        | 5   |
| Mandatory disclosure of information               | 990  | 4.1  | 1    | 1   | 4        | 4        | 5        | 5   |
| Development and cooperation assistance            | 1030 | 4.3  | 0.86 | 1   | 4        | 5        | 5        | 5   |
| Consumer information campaigns                    | 1052 | 4.1  | 1    | 1   | 3        | 4        | 5        | 5   |
| Green diplomacy                                   | 921  | 4.1  | 1    | 1   | 3        | 4        | 5        | 5   |
| Stakeholder group                                 | 400  |      |      |     |          |          |          |     |
| Business                                          | 89   | 22%  |      |     |          |          |          |     |
| Citizen                                           | 193  | 48%  |      |     |          |          |          |     |
| NGO                                               | 79   | 20%  |      |     |          |          |          |     |
| Other                                             | 23   | 6%   |      |     |          |          |          |     |
| Research                                          | 16   | 4%   |      |     |          |          |          |     |
| Organization size                                 | 207  |      |      |     |          |          |          |     |
| Micro (1 to 9 employees)                          | 67   | 32%  |      |     |          |          |          |     |
| Small (1 to 49 employees)                         | 45   | 22%  |      |     |          |          |          |     |
| Medium (5 to 249 employees)                       | 42   | 20%  |      |     |          |          |          |     |
| Large (25 or more)                                | 53   | 26%  |      |     |          |          |          |     |
| Country                                           | 400  |      |      |     |          |          |          |     |
| Belgium                                           | 55   | 14%  |      |     |          |          |          |     |
| Brazil                                            | 21   | 5%   |      |     |          |          |          |     |
| France                                            | 28   | 7%   |      |     |          |          |          |     |
| Germany                                           | 32   | 8%   |      |     |          |          |          |     |
| Italy                                             | 102  | 26%  |      |     |          |          |          |     |
| Netherlands                                       | 23   | 6%   |      |     |          |          |          |     |
| Sweden                                            | 18   | 4%   |      |     |          |          |          |     |
| United Kingdom                                    | 13   | 3%   |      |     |          |          |          |     |
| United States                                     | 16   | 4%   |      |     |          |          |          |     |
| Other                                             | 92   | 23%  |      |     |          |          |          |     |

(Continues)

**TABLE A1** | (Continued)

| Variables                                       | N    | Mean | SD | Min | Pctl. 25 | Pctl. 50 | Pctl. 75 | Max |
|-------------------------------------------------|------|------|----|-----|----------|----------|----------|-----|
| EU affiliation                                  | 400  |      |    |     |          |          |          |     |
| EU                                              | 310  | 78%  |    |     |          |          |          |     |
| Non-EU                                          | 90   | 22%  |    |     |          |          |          |     |
| Main sector                                     | 1120 |      |    |     |          |          |          |     |
| Biodiversity and/or environment                 | 440  | 39%  |    |     |          |          |          |     |
| Climate change                                  | 78   | 7%   |    |     |          |          |          |     |
| Consumption (general) and/or consumer interests | 58   | 5%   |    |     |          |          |          |     |
| Education                                       | 81   | 7%   |    |     |          |          |          |     |
| Scientific research                             | 40   | 4%   |    |     |          |          |          |     |
| Services (general)                              | 50   | 4%   |    |     |          |          |          |     |
| Other                                           | 373  | 33%  |    |     |          |          |          |     |

## Appendix B



**FIGURE A1** | Data cleaning process for linear regression models.

**TABLE A2** | Organizations included in the linear regression models.

| Organization name                                                                                 | User type                           | Stakeholder group | Organization size            | Country       |
|---------------------------------------------------------------------------------------------------|-------------------------------------|-------------------|------------------------------|---------------|
| ACE – The Alliance for Beverage Cartons and the Environment                                       | Business association                | Business          | Micro (1 to 9 employees)     | Belgium       |
| AJEMALEBU SELF HELP (AJESH)                                                                       | Non-governmental organization (NGO) | NGO               | Small (10 to 49 employees)   | Cameroon      |
| ALDI SÜD Group                                                                                    | Company/business organization       | Business          | Large (250 or more)          | Austria       |
| ALLIANCE FOR THE PRESERVATION OF FORESTS                                                          | Business association                | Business          | Micro (1 to 9 employees)     | France        |
| Amfori                                                                                            | Business association                | Business          | Small (10 to 49 employees)   | Belgium       |
| APAG, the European Oleochemicals and Allied Products Group                                        | Business association                | Business          | Medium (50 to 249 employees) | Belgium       |
| ARCHER DANIELS MIDLAND COMPANY                                                                    | Company/business organization       | Business          | Large (250 or more)          | United States |
| AVEC                                                                                              | Company/business organization       | Business          | Micro (1 to 9 employees)     | Belgium       |
| BASF                                                                                              | Company/business organization       | Business          | Large (250 or more)          | Germany       |
| BOS+                                                                                              | Non-governmental organization (NGO) | NGO               | Small (10 to 49 employees)   | Belgium       |
| BUND e.V. Ortsgruppe Neckargemünd                                                                 | Environmental organization          | NGO               | Medium (50 to 249 employees) | Germany       |
| Canto da Seriema Farm                                                                             | Other                               | Other             | Micro (1 to 9 employees)     | Brazil        |
| Cargill                                                                                           | Company/business organization       | Business          | Large (250 or more)          | United States |
| CDP Worldwide (Europe) gGmbH                                                                      | Non-governmental organization (NGO) | NGO               | Medium (50 to 249 employees) | Germany       |
| Centre for Investigative Journalism, Education and Climate (CIJEC)                                | Environmental organization          | NGO               | Micro (1 to 9 employees)     | Kenya         |
| CERELIA                                                                                           | Company/business organization       | Business          | Large (250 or more)          | France        |
| CESEFOR (Fundación Centro de Servicios y Promoción Forestal y de su Industria de Castilla y León) | Academic/research institution       | Research          | Small (10 to 49 employees)   | Spain         |
| Cesio – European Committee of Organic Surfactants and their Intermediates                         | Business association                | Business          | Medium (50 to 249 employees) | Belgium       |
| Chalmers University of Technology                                                                 | Other                               | Other             | Large (250 or more)          | Sweden        |
| Cheshire                                                                                          | Company/business organization       | Business          | Micro (1 to 9 employees)     | Italy         |
| CIARACEC (argentine edible oil and cereals exporters)                                             | Company/business organization       | Business          | Large (250 or more)          | Argentina     |
| ClientEarth                                                                                       | Non-governmental organization (NGO) | NGO               | Medium (50 to 249 employees) | Belgium       |
| ClimateX                                                                                          | Environmental organization          | NGO               | Small (10 to 49 employees)   | Pakistan      |
| COCERAL                                                                                           | Business association                | Business          | Micro (1 to 9 employees)     | Belgium       |
| Competere – Policies for sustainable development                                                  | Non-governmental organization (NGO) | NGO               | Micro (1 to 9 employees)     | Italy         |
| Council of European Chemical industries/Specialty chemicals Industry sector                       | Business association                | Business          | Medium (50 to 249 employees) | Belgium       |
| Earth Innovation Institute                                                                        | Academic/research institution       | Research          | Small (10 to 49 employees)   | United States |

(Continues)

**TABLE A2** | (Continued)

| Organization name                                                                | User type                           | Stakeholder group | Organization size            | Country        |
|----------------------------------------------------------------------------------|-------------------------------------|-------------------|------------------------------|----------------|
| ECO-Consulting Group                                                             | Other                               | Other             | Medium (50 to 249 employees) | Cameroon       |
| Environmental Investigation Agency (EIA)                                         | Non-governmental organization (NGO) | NGO               | Small (10 to 49 employees)   | United Kingdom |
| Environmental Justice Foundation Charitable Trust                                | Non-governmental organization (NGO) | NGO               | Medium (50 to 249 employees) | United Kingdom |
| European Palm Oil Alliance (EPOA)                                                | Company/business organization       | Business          | Micro (1 to 9 employees)     | Netherlands    |
| European Panel Federation                                                        | Company/business organization       | Business          | Micro (1 to 9 employees)     | Belgium        |
| FEDIOL – The EU Vegetable Oil and Proteinmeal Industry                           | Company/business organization       | Business          | Micro (1 to 9 employees)     | Belgium        |
| FEFAC                                                                            | Company/business organization       | Business          | Micro (1 to 9 employees)     | Belgium        |
| FEP – the European Federation of the Parquet industry                            | Business association                | Business          | Micro (1 to 9 employees)     | Belgium        |
| Forest Stewardship Council (FSC)                                                 | Non-governmental organization (NGO) | NGO               | Medium (50 to 249 employees) | Germany        |
| Generation Climate Europe                                                        | Non-governmental organization (NGO) | NGO               | Medium (50 to 249 employees) | Belgium        |
| Giacimenti Urbani                                                                | Environmental organization          | NGO               | Micro (1 to 9 employees)     | Italy          |
| Global Forest Coalition                                                          | Non-governmental organization (NGO) | NGO               | Small (10 to 49 employees)   | Netherlands    |
| Global Witness                                                                   | Non-governmental organization (NGO) | NGO               | Medium (50 to 249 employees) | United Kingdom |
| Golden Agri-Resources                                                            | Company/business organization       | Business          | Large (250 or more)          | Indonesia      |
| GUAYAPI                                                                          | Company/business organization       | Business          | Small (10 to 49 employees)   | France         |
| Gube                                                                             | Company/business organization       | Business          | Micro (1 to 9 employees)     | Brazil         |
| Health Care Without Harm Europe                                                  | Non-governmental organization (NGO) | NGO               | Small (10 to 49 employees)   | Belgium        |
| Henkel AG & Co. KGaA                                                             | Company/business organization       | Business          | Large (250 or more)          | Germany        |
| High Carbon Stock Approach                                                       | Other                               | Other             | Small (10 to 49 employees)   | Singapore      |
| IDH The Sustainable Trade Initiative                                             | Non-governmental organization (NGO) | NGO               | Large (250 or more)          | Netherlands    |
| Inapp                                                                            | Academic/research institution       | Research          | Large (250 or more)          | Italy          |
| INEVA – Iniciativa en Gestion Forestal                                           | Company/business organization       | Business          | Micro (1 to 9 employees)     | Spain          |
| Institute for the BioEconomy of the National Research Council of Italy – IBE-CNR | Academic/research institution       | Research          | Large (250 or more)          | Italy          |
| Institute of Advanced Studies, University of São Paulo, Brazil                   | Academic/research institution       | Research          | Large (250 or more)          | Brazil         |
| Kaoem Telapak                                                                    | Non-governmental organization (NGO) | NGO               | Micro (1 to 9 employees)     | Indonesia      |
| Laudato si z.s.                                                                  | Environmental organization          | NGO               | Micro (1 to 9 employees)     | Czechia        |
| Mars Incorporated                                                                | Company/business organization       | Business          | Large (250 or more)          | United States  |
| Mighty Earth                                                                     | Non-governmental organization (NGO) | NGO               | Small (10 to 49 employees)   | United States  |
| National Wildlife Federation                                                     | Non-governmental organization (NGO) | NGO               | Large (250 or more)          | United States  |

(Continues)

**TABLE A2** | (Continued)

| Organization name                                                         | User type                           | Stakeholder group | Organization size            | Country        |
|---------------------------------------------------------------------------|-------------------------------------|-------------------|------------------------------|----------------|
| Natuurpunt vzw                                                            | Non-governmental organization (NGO) | NGO               | Large (250 or more)          | Belgium        |
| Nestlé                                                                    | Company/business organization       | Business          | Large (250 or more)          | Switzerland    |
| Paraguayan Chamber of Oilseed and Cereal Crushers (CAPPRO)                | Business association                | Business          | Micro (1 to 9 employees)     | Paraguay       |
| Pohjois-Pohjanmaan lintutieteellinen yhdistys ry                          | Non-governmental organization (NGO) | NGO               | Micro (1 to 9 employees)     | Finland        |
| Proforest                                                                 | Company/business organization       | Business          | Medium (50 to 249 employees) | United Kingdom |
| Protect the Forest                                                        | Non-governmental organization (NGO) | NGO               | Micro (1 to 9 employees)     | Sweden         |
| Rainforest Alliance                                                       | Non-governmental organization (NGO) | NGO               | Large (250 or more)          | Netherlands    |
| RAUL TOSCANO SL                                                           | Company/business organization       | Business          | Small (10 to 49 employees)   | Spain          |
| Red Ecuatoriana de Alternativas a la Palma Aceitera                       | Other                               | Other             | Micro (1 to 9 employees)     | Ecuador        |
| Serikat Petani Kelapa Sawit (Oil Palm Smallholder Farmer Union)/SPKS      | Non-governmental organization (NGO) | NGO               | Micro (1 to 9 employees)     | Indonesia      |
| Sideral Minerios do Brasil                                                | Company/business organization       | Business          | Large (250 or more)          | Brazil         |
| Spanish Foundation for Sustainable Palm Oil                               | Company/business organization       | Business          | Micro (1 to 9 employees)     | Spain          |
| Suomen luonnonsuojeluliitto (Finnish Association for Nature Conservation) | Non-governmental organization (NGO) | NGO               | Medium (50 to 249 employees) | Finland        |
| TESAF Dept – Univ. of Padova                                              | Academic/research institution       | Research          | Large (250 or more)          | Italy          |
| The Accountability Framework initiative                                   | Other                               | Other             | Micro (1 to 9 employees)     | United States  |
| TRAFFIC                                                                   | Non-governmental organization (NGO) | NGO               | Medium (50 to 249 employees) | Hungary        |
| Tropenbos International                                                   | Non-governmental organization (NGO) | NGO               | Small (10 to 49 employees)   | Netherlands    |
| Turun yliopisto                                                           | Academic/research institution       | Research          | Large (250 or more)          | Finland        |
| UCLouvain and F.R.S.-FNRS                                                 | Academic/research institution       | Research          | Large (250 or more)          | Belgium        |
| Unione Italiana per l'Olio di Palma Sostenibile                           | Business association                | Business          | Micro (1 to 9 employees)     | Italy          |
| Universidade do Vale do Sapucaí (UNIVAS)                                  | Academic/research institution       | Research          | Large (250 or more)          | Brazil         |
| Universidade Federal de Minas Gerais                                      | Academic/research institution       | Research          | Large (250 or more)          | Brazil         |
| Universidade Federal de Rondonópolis                                      | Academic/research institution       | Research          | Medium (50 to 249 employees) | Brazil         |
| Upfield Europe B.V.                                                       | Company/business organization       | Business          | Large (250 or more)          | Netherlands    |
| Vandecasteele Houtimport                                                  | Company/business organization       | Business          | Medium (50 to 249 employees) | Belgium        |
| Verein Robin                                                              | Non-governmental organization (NGO) | NGO               | Micro (1 to 9 employees)     | Italy          |
| Wilmar Europe Trading BV                                                  | Company/business organization       | Business          | Large (250 or more)          | Netherlands    |
| World Resources Institute                                                 | Non-governmental organization (NGO) | NGO               | Large (250 or more)          | United States  |

(Continues)

**TABLE A2** | (Continued)

| Organization name              | User type                           | Stakeholder group | Organization size            | Country |
|--------------------------------|-------------------------------------|-------------------|------------------------------|---------|
| WWF Denmark Verdensnaturfonden | Environmental organization          | NGO               | Medium (50 to 249 employees) | Denmark |
| WWF FRANCE                     | Non-governmental organization (NGO) | NGO               | Medium (50 to 249 employees) | France  |
| WWF Germany                    | Non-governmental organization (NGO) | NGO               | Large (250 or more)          | Germany |
| WWF ITALIA ONLUS               | Non-governmental organization (NGO) | NGO               | Medium (50 to 249 employees) | Italy   |
| WWF Italy                      | Environmental organization          | NGO               | Medium (50 to 249 employees) | Italy   |
| WWF-Belgium                    | Non-governmental organization (NGO) | NGO               | Medium (50 to 249 employees) | Belgium |

[Correction added on 11 December 2025, after first online publication: Table A2 has been updated to remove duplicate data already present in Tables 1, 3, and 4.]