




RESEARCH ARTICLE

How does the European Green Deal affect the disclosure of environmental information?

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Abstract

The European Union has made the fight against climate change and the achievement of a sustainable economy political priorities. To promote the ecological transition of companies and corporate transparency, a broad regulatory framework has been developed. This paper analyses the effect of institutional pressures derived from this regulatory framework on the environmental information disclosed by 832 multinationals in the period 2011–2020. The results reveal a positive global effect, although, at an individual level, this effect is only maintained for the regulations and recommendations related to non-financial information and the European Green Deal. Furthermore, the impact differs depending on the category of environmental information disclosed.

KEYWORDS

corporate transparency, European Green Deal, European Union, regulatory framework, sustainability reporting

1 | INTRODUCTION

The promotion of corporate sustainability and transparency has occupied a prominent place on the political agenda of the European Union (EU), a region especially active in this field (Eckert, 2021; Hąbek & Wolniak, 2016), introducing several regulatory instruments that articulate a coherent framework for the disclosure of corporate information on sustainability. The last link in the regulation process at the EU level is represented by the different instruments that support the strategy established in the European Green Deal (EDG) to achieve

the objective of climate neutrality in 2050 (EU Commission, 2020), in which the disclosure requirements for information on sustainability are developed in line with the broader EU legal framework on sustainable finance (EFRAG, 2021; Ortiz-Martínez et al., 2023).

This change from a voluntary to a mandatory disclosure framework has revived the debate on the advisability of regulating the disclosure of non-financial information in force in recent decades (Korca et al., 2021). Supporters of regulating the disclosure of sustainability information defend its positive effect on the quantity and quality of the information disclosed, making it more credible and comparable

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(Ottenstein et al., 2022) and increasing the number of companies that disclose information (Monteiro & Aibar-Guzmán, 2010; Pedersen et al., 2013). Opponents of the regulation point out that it does not always imply a higher quality of disclosed information (Bebbington et al., 2012), nor does it guarantee the disclosure of a greater amount of information (Costa & Agostini, 2016). They also argue that the regulation can limit the proactivity of companies (Tarquinio et al., 2020), causing them to limit themselves to complying with the requirements established in the regulations (Larrinaga et al., 2002). Therefore, the regulation of the disclosure of non-financial and sustainability information is configured as a 'double-edged sword' (Hąbek & Wolniak, 2016, p. 403), without a clear effect on the organisational behaviour in terms of sustainability and the quality of the disclosed information (Caputo et al., 2021).

The EGD and related regulatory framework represent an opportunity to expand existing knowledge regarding the effects of regulating the disclosure of sustainability information (Ortiz-Martínez & Marín-Hernández, 2022). In this sense, in recent years researchers have shown considerable interest in analysing the impact of the new EU regulations, although most studies have focused on Directive 2014/95/EU (García-Sánchez, Sierra-García, & García-Benau, 2022). With these premises, and based on the postulates of institutional theory, this paper aims to analyse the effect of the EU regulatory framework on the environmental information disclosed by companies. Moreover, taking into account that the impact of regulations may vary depending on the category of information in question (Korca et al., 2021), we also intend to identify those categories of material information on environmental issues that are more (less) affected by the EU regulatory framework.

The results for a sample of 832 multinationals for the period 2011–2020 (8320 observations) indicate the existence of a positive global effect of the EU regulatory framework on the disclosure of environmental information, although, at the individual level, this effect is only maintained for the regulations and recommendations related to non-financial information and the EGD, with the effect of the framework principles relating to the Action Plan on sustainable finance and the European Commitment to the 2030 Agenda being statistically irrelevant. Moreover, this impact differs depending on the category of environmental information being considered.

This study contributes to the current debate on the advisability of a voluntary or mandatory framework for the disclosure of sustainability information and expands the existing knowledge regarding the effects of the regulatory framework that regulates the disclosure of non-financial information in the EU, thus responding to the need for more empirical evidence in this regard highlighted by Johansen (2016). Compared with previous studies, focused on the impact of Directive 2014/95/EU, we provide a broader analysis considering both the global effect of the European regulatory framework and the individual effects of the various European initiatives related to the disclosure of environmental information and determining which of them has a greater explanatory power on corporate transparency in terms of environmental information. Furthermore, we identify their impact on the different categories of material information on environmental matters.

The paper is structured as follows. After this introduction, Section 2 summarises the characteristics of the European institutional framework in relation to the disclosure of sustainability information. Section 3 contains the theoretical framework and the literature review. Section 4 presents the study's empirical framework. Section 5 presents the results, which are discussed in Section 6. Finally, Section 7 contains the main conclusions of the study, the limitations of the research and possible future extensions.

2 | EUROPEAN INSTITUTIONAL FRAMEWORK IN RELATION TO THE DISCLOSURE OF SUSTAINABILITY INFORMATION

The EU has always shown high sensitivity towards sustainability (Schönborn et al., 2019). Among the most important initiatives developed in the EU in the last 10 years related to sustainability are the Communication of the EC of 22 November 2016, 'Next steps for a sustainable European future. European action for sustainability', establishing the lines of action for the global and integrated application of the 2030 Agenda and the achievement of the Sustainable Development Goals (SDGs); the EC's Communication of 8 March 2018, 'Action Plan: Financing sustainable growth', in which the strategy regarding sustainable finances was specified and several recommendations and regulatory proposals were proposed (EU Commission, 2018); the EGD (EC's Communication of 11 December 2019), establishing the strategy to achieve the objective of climate neutrality in 2050; and, as part of the EGD's regulatory agenda, the European Climate Law, approved on 30 June 2021 [Regulation (EU) 2021/1119], in which the political commitment to achieve climate neutrality becomes a legal obligation (EU, 2021).

Regarding the disclosure of information on sustainability, Directive 2014/95/EU, published on 22 October 2014 by the European Parliament, stands out (EU, 2014). It established the mandatory legal framework for the reporting of non-financial information in the EU Member States and represented a major change by making previous disclosure requirements mandatory (Aureli et al., 2020) and imposing new requirements regarding the disclosure of non-financial and diversity information (García-Benau et al., 2022). Directive 2014/95/EU was supplemented by two communications (2017/C 215/01 and 2019/C 209/01) with non-binding guidelines on non-financial reporting, which established a methodology for the presentation of non-financial information (EU Commission, 2017, 2019). Recently, Directive 2014/95/EU has been amended by Directive 2022/2464/EU as regards corporate sustainability reporting, approved on 14 December 2022 by the European Parliament, which revises the disclosure requirements for non-financial information to be more consistent with the broader regulatory framework for sustainable finance and in line with the objectives of the EGD. The new directive will enter into force on 1 January 2024.

Likewise, as part of the EU Action Plan on sustainable finance, Regulation (EU) 2020/852 of 18 June 2020 on the establishment of a framework to facilitate sustainable investments (Taxonomy Regulation) lays the foundations for a classification system for environmentally sustainable economic activities, translating the EU's climate and environmental objectives into clear criteria (EU, 2020).

3 | THEORETICAL FRAMEWORK, LITERATURE REVIEW AND RESEARCH QUESTIONS

From the institutional theory's perspective, organisations are integrated into organisational fields, defined as groups of organisations that interact directly or indirectly and that, taken together, 'constitute a recognized area of institutional life' (DiMaggio & Powell, 1983, p. 148), modelling the behaviour of its members (Scott, 1995). Thus, organisations adapt to the institutions that dominate their organisational field in order to maintain their legitimacy (L'Abate et al., 2023). Among the organisations belonging to an organisational field, what DiMaggio and Powell (1983) define as institutional isomorphism is produced, which consists in a homogenisation process by which the dominant norms in the organisational field are transferred to the organisations that compose it, making them increasingly similar to each other.

Institutional isomorphism operates through three basic mechanisms (coercion, mimicry and normalisation) depending, respectively, on whether isomorphism derives from the existence of a certain obligation or conditioning; from the desire to imitate structures, systems, or behaviours considered better or more effective; or from the professionalisation of an activity (Scott, 1995). With regard to coercive isomorphism, institutional pressures can derive from two sources: the pressures exerted on an organisation by other organisations or agents on which it depends directly or indirectly, or the existence of a certain legal framework (Meyer & Rowan, 1977); and mainly seeks to avoid economic and social sanctions derived from non-compliance with existing rules in the institutional environment.

Although, due to its supranational character and economic power, the EU has 'the capacity to set world standards in normative terms' (Rosecrance, 1998, p. 22), its geopolitical orientation and the fact that beyond promoting norms it has the capacity to enforce them confer on the EU a regulatory power (Eckert, 2021; Manners, 2002). Thus, the coercive pressures derived from the growing regulation on the disclosure of non-financial information have promoted, directly or indirectly, corporate transparency in this area (Tran & Beddewela, 2020). Therefore, this EU regulatory framework is expected to result in coercive pressures on companies (Korca et al., 2021) that positively affect both the quantity and the quality of the information on sustainability disclosed (García-Sánchez, Sierra-García, & García-Benau, 2022; Mio et al., 2021).

However, the empirical evidence in this regard is not conclusive (Aureli et al., 2020; Hummel & Rötzel, 2019). Several studies document an increase in the quantity and quality of non-financial information as a result of the entry into force of Directive 2014/95/EU (Korca et al., 2021; Mio et al., 2021), while other studies posit that the European regulation of the disclosure of sustainability information can cause an undesirable discouraging effect (Eccles, 2004) and does not lead to an increase in the information disclosed or in its quality (Tarquinio et al., 2020). Thus, in the face of the coercive pressures derived from the new regulation on mandatory disclosure of sustainability information, companies may not adopt a uniform response (Pedersen et al., 2013) and, consequently, the global objective of greater transparency and corporate sustainability that the EU pursues with this new regulatory framework may not be met (Aureli et al., 2020).

Therefore, the first research question has to do with knowing the impact that the institutional pressures derived from the EU regulatory framework have on the disclosure of environmental information:

RQ1: How does the EU regulatory framework affect the disclosure of environmental information?

From the institutional theory perspective, Oliver (1991) recognises that faced with institutional pressures, companies can adopt different strategic responses ranging from conformity to active resistance, depending on the strength of such pressures and the degree of uncertainty in the organisational field. According to Bebbington et al. (2012), the probability that companies comply with disclosure regulations is greater when such regulations are consistent with the prevailing values in the institutional context and form a coherent framework, as well as when the requirements are stated clearly and precisely. Ioannou and Serafeim (2017) refer to the influence of the regulation's rigour and strength (enforcement) on the effect it has on disclosure.

Thus, for example, Chelli et al. (2018) showed that regulation issued by central governments has a greater impact on disclosure than that from stock markets. Along these lines, for Matuszak and Różańska (2021), the fact that in the case of Poland in the transposition of Directive 2014/95/EU into national legislation, sanctions have been established for companies that do not comply with the requirements to develop disclosure standards and the fact that the country's legal environment is characterised by a strict level of compliance with the law will positively affect compliance with the Directive. In opposition to these ideas, Mio et al. (2021) found that regulations that provide incentives are more effective than those that impose costs.

Hummel and Rötzel (2019) point out that most of the regulations on the disclosure of information on sustainability are based on the principle 'comply or explain', which reduces the strength of the regulation, leaving the decision of disclosure in the hands of companies. In the specific case of Directive 2014/95/EU, Pizzi et al. (2020) showed that Italian companies resorted to applying this principle to avoid disclosing unfavourable or adverse information. Caputo et al. (2021) and Korca et al. (2021) refer to the fact that Directive 2014/95/EU adopts a proposal based on principles without establishing specific requirements. Tarquinio et al. (2020) and Carmo and Ribeiro (2022) refer to the flexibility of the Directive to explain the reason for its limited effects on corporate transparency regarding sustainability.

Given that the EU regulatory framework on sustainability information is made up of various initiatives that include framework principles on sustainability and standards or recommendations with different degrees of linkage with respect to sustainability disclosure, the following three research questions are posited:

RQ2: What is the individual impact of each of the initiatives associated with the EU regulatory framework on the disclosure of environmental information?

RQ3: Which of the initiatives associated with the EU regulatory framework has the greatest/least impact on the disclosure of environmental information?

RQ4: What categories of environmental information are more/less affected by the different initiatives associated with the EU regulatory framework?

4 | METHOD

4.1 | Sample description

The major multinationals worldwide were selected as the target population. This choice is justified because these companies are subject to greater scrutiny by the media, regulators and specialised groups, among others, and also have the resources and capacities to meet and even anticipate their stakeholders' demands. The period of study corresponds to the last decade with available information (2011–2020), which allows us to analyse the disclosure of information prior and after regulation, in addition to homogenising the requirements that currently exist in environmental matters.

From the financial and ESG information available in the Thomson Reuters EIKON database, an initial sample of 2933 companies (21,226 observations) was configured. The initial sample configuration criterion was determined by the existence of ESG information for at least 1 year in the period analysed. Next, companies for which the information necessary to estimate the empirical models was not available, either due to the lack of information for the creation of the variables or due to the existence of time gaps, were eliminated. Thus, the final sample is made up of 832 multinationals, forming a balanced data panel of 8320 observations. Companies located in the EU account for 29.45% of the sample.

4.2 | Models

The models designed to answer the research questions are reflected in Equations 1 and 2. Both are delayed endogenous models, due to the relationship between the levels of information disclosed in exercise t and in the immediately preceding one, $t - 1$ (García-Sánchez, Minutiello, & Tettamanzi, 2022).

$$\begin{aligned} \text{EnvDiscl}_{i,t} = & \beta_0 + \beta_1 \text{EnvDiscl}_{i,t-1} + \beta_2 \text{EUpressures}_{i,t} + \beta_3 \text{EnvPerf}_{i,t} \\ & + \beta_4 \text{Inage}_{i,t} + \beta_5 \text{Insize}_{i,t} + \beta_6 \text{ROA}_{i,t} + \beta_7 \text{Leverage}_{i,t} \\ & + \beta_8 \text{R\&D}_{i,t} + \beta_9 \text{Adverstising}_{i,t} + \beta_{10} \text{Capex}_{i,t} + \beta_{11} \text{InstInve}_{i,t} \\ & + \beta_{12} \text{Analysts}_{i,t} + \beta_{13} \text{Bsize}_{i,t} + \beta_{14} \text{Bactivity}_{i,t} + \beta_{15} \text{Bindep}_{i,t} \\ & + \beta_{16} \text{CEOduality}_{i,t} + \beta_{17} \text{Bwomen}_{i,t} + \beta_{18} \text{Country}_i \\ & + \beta_{19} \text{Industry}_i + \beta_{20} \text{Year}_t + \varepsilon_{it} + \eta_i \end{aligned} \quad (1)$$

$$\begin{aligned} \text{EnvDiscl}_{i,t} = & \beta_0 + \beta_1 \text{EnvDiscl}_{i,t-1} + \beta_2 \text{Directive2014}_{i,t} + \beta_3 \text{Taxonomy}_{i,t} \\ & + \beta_4 \text{Guidelines}_{i,t} + \beta_5 \text{GreenDeal}_{i,t} + \beta_6 \text{ActionPlan}_{i,t} \\ & + \beta_7 \text{EU2030Agenda}_{i,t} + \beta_8 \text{EnvPerf}_{i,t} + \beta_9 \text{Inage}_{i,t} \\ & + \beta_{10} \text{Insize}_{i,t} + \beta_{11} \text{ROA}_{i,t} + \beta_{12} \text{Leverage}_{i,t} + \beta_{13} \text{R\&D}_{i,t} \\ & + \beta_{14} \text{Adverstising}_{i,t} + \beta_{15} \text{Capex}_{i,t} + \beta_{16} \text{InstInve}_{i,t} \\ & + \beta_{17} \text{Analysts}_{i,t} + \beta_{18} \text{Bsize}_{i,t} + \beta_{19} \text{Bactivity}_{i,t} + \beta_{20} \text{Bindep}_{i,t} \\ & + \beta_{21} \text{CEOduality}_{i,t} + \beta_{22} \text{Bwomen}_{i,t} + \beta_{23} \text{Country}_i \\ & + \beta_{24} \text{Industry}_i + \beta_{25} \text{Year}_t + \varepsilon_{it} + \eta_i \end{aligned} \quad (2)$$

Both models will be estimated using censored regressions for panel data, due to the nature of the dependent variable EnvDiscl, which takes values between 0 and 55. Additionally, to obtain robust results, difference models will be estimated, substituting the variable EnvDiscl by $\Delta\text{EnvDiscl}$, which does not require consideration of the delayed endogenous variable.

4.3 | EnvDiscl: Information on environmental issues

'Materiality, like beauty, is in the eye of the beholder' (Hicks, 1961, p. 159). We carried out an analysis of what could be material for multinationals according to the different existing frameworks and regulations on the subject, for example the recommendations proposed by the Sustainability Accounting Standards Board (SASB), the Global Reporting Initiative (GRI), the International Integrated Reporting Council (IIRC). This analysis was based on the criteria of double materiality, through which material environmental issues are identified by combining the approaches of financial materiality and impact materiality (Baumüller & Sopp, 2022), creating a general reference framework on what we understand as material environmental information, depicted in Table 1. Thus, information on environmental issues reflects the companies' approach regarding the investments and the measures to prevent and limit the current and foreseeable effects of the company's activities on the environment and health and safety, as well as information related to efficiency in the use of resources, circular economy initiatives, waste management, climate change and protection of biodiversity and animal welfare.

Subsequently, through content analysis, we identified whether the sample companies disclosed such information in their non-financial reports, coding as 1 the presence of each item of information and 0 otherwise. This procedure led to the creation of three sub-scores relating to information on the environmental management approach, irresponsible behaviour and specific information on environmental issues. This last sub-score was built on five sub-dimensions: sustainable use of resources, circularity initiatives, waste management, climate change, and biodiversity and animal welfare (listed in Table 1 as a–e). Finally, the EnvDiscl composite indicator was created as the sum of the information disclosed by the companies for each item, taking values in the interval between 0 and 55.

To guarantee the robustness of the results, the EnvDiscl variable was broken down into seven possible sub-scores: EnvManag, Irres-Beh, EnvResources, Circularity, Residuals, ClimateChange and Biodiversity. Additionally, because EnvDiscl is expressed in absolute values (total number of items disclosed), %EnvDiscl is used to reflect relative values (percentage of items disclosed).

4.4 | EUpressures: European institutional framework

The independent variables correspond to Directive2014, Taxonomy, Guidelines, GreenDeal, ActionPlan and EU2030Agenda. The first

TABLE 1 Material information on environmental issues.

Information on the management approach

- ENV1. Environmental policies or practices that govern the company's activity
 ENV2. Environmental policies governing supply chain activity
 ENV3. Establishment of environmental goals and objectives
 ENV4. Environmental investments
 ENV5. Environmental audit, evaluation or certification procedures
 ENV6. Precautionary principle and its application
 ENV7. Resources, provisions and guarantees for environmental risks
 ENV8. Committed assets in regions likely to be more exposed to acute or chronic climate risks
 ENV9. Green finance, identifying the amount and percentage of financial investments and external financing related to sustainability criteria or ESG

Information on pollution and irresponsible behaviour

- ENV10. Air pollution, including noise and light pollution
 ENV11. Significant spills (volume, location, spill material and impacts)
 ENV12. Discharge of water and/or runoff (volume, water quality, destination of the discharge and impact on water bodies or affected habitats)
 ENV13. Non-compliance with environmental legislation and regulations, identifying significant non-monetary fines and sanctions and/or cases subject to dispute resolution mechanisms. Brief statement that the organisation has not identified non-compliance with environmental laws or regulations

Specific information on environmental issues

*a. Sustainable use of resources**Energy*

- ENV14. Energy efficiency policy
 ENV15. Establishment of goals and objectives related to energy efficiency
 ENV16. Energy consumption within the organisation (in joules or multiples)
 - Total energy consumption
 - Energy consumption by type of fuel
 - Consumption by type of energy (i. electricity consumption; ii. heating consumption; iii. cooling consumption; iv. steam consumption)
 ENV17. Use of renewable energies by differentiating energy consumption between renewable and non-renewable sources
 ENV18. Energy intensity according to specific parameters (denominator) for the previous items
 ENV19. Reduction of energy consumption as a direct result of conservation and efficiency initiatives. Excluding reductions due to outsourcing or reduction of production or productive capacity
 ENV20. Energy consumption outside the organisation

Water

- ENV21. Policy to improve water management
 ENV22. Establishment of water management goals and objectives
 ENV23. Extraction or origin of water (in megalitres):
 - Total extraction or origin of water (in megalitres)
 - Extraction or origin of water based on the following sources: i. superficial water; ii. underground water; iii. sea water; iv. produced water; v. third-party water
 - Extraction or origin of water differentiating areas with hydric stress
 - Extraction or origin of water differentiating between fresh water and other waters
 ENV24. Water consumption:
 - Total water consumption
 - Water consumption differentiating areas with hydric stress
 ENV25. Storage and reuse of water

Materials

- ENV26. Policy to improve efficiency in the use of materials
 ENV27. Establishment of goals and objectives related to the efficiency in the use of materials
 ENV28. Consumption of materials in carrying out the economic activity (expressed by weight or volume):
 - Total consumption of materials
 - Consumption of materials differentiating between non-renewable and renewable materials
 ENV29. Percentage of recycled materials used
 ENV30. Reused products and packaging materials

b. Circularity initiatives

- ENV31. Investment in green buildings (total and percentage)
 ENV32. Investment in clean technologies (total and percentage)
 ENV33. Operating expenses corresponding to assets or processes linked to sustainable activities (total and percentage)
 ENV34. Sustainability of products and services:
 - Design initiatives regarding the use of sustainable materials
 - Reduction of energy requirements of products and services sold
 - Initiatives to minimise the impact on the use of products or services
 - Initiatives to minimise the impact at the end of life

(Continues)

TABLE 1 (Continued)

- Business volume corresponding to products or services linked to sustainable activities (total and percentage)
- ENV35. Supply chain environmental assessment:
- Number and percentage of suppliers that have passed selection filters according to environmental criteria
 - Number of suppliers identified as suppliers with potential and actual significant negative environmental impacts. Inclusion of indications as to whether the relationship has been terminated
 - Significant negative environmental impacts – potential and actual – identified in the supply chain

ENV36. Ecological and sustainable transport measures

ENV37. Consumer awareness initiatives

c. Waste management

ENV38. Policy to prevent the generation of waste from the organisation's own activities and activities upstream and downstream in the value chain, as well as to manage the significant impact of the waste generated

ENV39. Establishment of goals and objectives related to waste

ENV40. Waste generated (in metric tonnes)

- Total waste generated
- Breakdown of total waste generated based on the composition of the waste
- Breakdown of the total depending on whether the waste is destined for disposal

ENV41. Hazardous waste not destined for disposal in metric tonnes and breakdown of this total based on the following recovery operations: i. preparation for reuse; ii. recycling; iii. other valuation operations

ENV42. Hazardous waste destined for disposal in metric tonnes and breakdown of this total based on the following disposal operations: i. reuse; ii. recycling; iii. composting; iv. recovery, including energy recovery; v. incineration with and without energy recovery (mass burning); vi. injection in deep wells; vii. landfill; viii. on-site storage; ix. others (to be specified by the organisation)

ENV43. Waste disposal method, identifying whether disposal is direct by the organisation or by the waste disposal contractor

ENV44. Transportation of hazardous waste, differentiating between: i. transported hazardous waste; ii. imported hazardous waste; iii. exported hazardous waste; iv. treated hazardous waste. b. The percentage of hazardous waste transported to other countries

d. Climate change

ENV45. Climate change policy

ENV46. Goals and reduction objectives voluntarily established to reduce greenhouse gas (GHG) emissions in the medium and long-term and the means implemented for this purpose

ENV47. GHG emissions (in metric tonnes of CO₂ equivalent):

- Total GHG emissions
- Direct emissions (scope 1), indirect emissions when generating energy (scope 2), and other indirect emissions (scope 3) of GHG
- GHG emissions identified by the gases included in the calculation: CO₂, CH₄, N₂O, HFC, PFC, SF₆, NF₃ or all
- Biogenic CO₂ emissions in metric tonnes of CO₂ equivalent
- Source of the emission factors and global warming potential (GWP) rates used or a reference to the source of the GWP

ENV48. Intensity of GHG emissions according to specific parameters (denominator) for the previous items

ENV49. Reduction of GHG emissions for the previous items

ENV50. Emissions of substances that deplete the ozone layer (ODS)

ENV51. Significant air emissions (in kilogrammes or multiples) related to nitrogen oxides (NOX), sulphur oxides (SOX), and other significant air emissions: persistent organic pollutants (POPs), volatile organic compounds (VOCs), hazardous air pollutants (HAPs), particles (PM)

e. Protection of biodiversity and animal welfare

ENV52. Initiatives and measures taken to preserve or restore biodiversity

- Habitats protected or restored, with indication of size and location
- Partnerships created with third parties to protect or restore habitat areas

ENV53. Impacts caused by activities or operations in protected areas

- Operations centres located within or next to protected areas or areas of great value for biodiversity outside protected areas. Among others, the type of operation must be reported (office, manufacturing, production or extraction)
- Number of species that appear on the International Union for Conservation of Nature's red list of threatened species and on national conservation lists, differentiating by level of extinction risk: i. critically endangered; ii. endangered; iii. vulnerable; iv. near threatened; v. minor concern
- Significant direct and indirect impacts of activities, products and services on biodiversity: i. the construction or use of manufacturing plants, mines and transportation infrastructure; ii. pollution; iii. the introduction of invasive species, pests and pathogens; iv. species reduction; v. habitat transformation; vi. changes in ecological processes outside the natural range of variation
- Significant direct and indirect positive and negative impacts with reference to the following: i. the affected species; ii. the extent of the areas that have suffered impacts; iii. the duration of the impacts; iv. the reversibility or irreversibility of the impacts

ENV54. Initiatives to ensure animal welfare associated with ensuring that animals live free from (i) hunger, thirst and malnutrition; (ii) fear and anguish; (iii) physical and thermal discomfort and (iv) pain, injury and illness and initiatives to ensure they exhibit natural behaviour

ENV55. Initiatives aimed at the use of handling methods appropriate to the biological characteristics of the animals and a suitable environment to meet their needs

three variables involve the establishment of principles, standards, or recommendations with different degrees of connection with respect to the reporting of non-financial information, whereas the last three variables include framework principles on sustainability. All of them are dummies.

The Directive2014 variable takes a value of 1 for those companies whose parent company was located in an EU country during the 2014–2020 period, taking a value of 0 otherwise (García-Sánchez, Sierra-García, & García-Benau, 2022). The consideration of the effect of Directive 2014/95/EU from the year of approval is a consequence of the fact that, although this regulation allows 2 years for its transposition to the regulations of any country, many companies adopted it from the moment of its approval (Carini et al., 2018; Fiechter et al., 2022).

The Taxonomy variable takes a value of 1 for multinationals whose parent company is located in an EU country during the year 2020, taking a value of 0 otherwise. The Guidelines variable identifies the effect of the EC's guidelines on non-financial reporting published in 2017 (2017/C 215/01) and the non-binding guidelines published in 2019 (2019/C 209/01), a supplement to the 2017 guidelines regarding information related to the climate. It takes a value of 1 for companies based in the EU for the period 2017–2020.

The GreenDeal variable takes a value of 1 for companies that have their main headquarters in an EU country for the years 2019 and 2020, reflecting the effect of the EGD. The ActionPlan variable is coded with 1 for companies whose parent company is located in an EU country during the period 2018–2020, identifying the publication of the Action Plan: Financing sustainable growth (EC's Communication of 8 March 2018). The EU2030Agenda variable is coded with 1 for companies whose parent company is located in the EU during the 2016–2020 period to identify the publication of the EC's Communication of 22 November 2016, in which the political and action framework that the EU proposes to achieve a sustainable Europe with the SDGs are linked.

Additionally, we created the EUpressures variable, a score computed by adding the previous dummies, to identify the joint effect in each year of the different sustainability and corporate transparency initiatives developed by the EU, taking values between 0 and 6.

4.5 | Control variables

To correct potential biases, based on prior literature (García-Sánchez, Sierra-García, & García-Benau, 2022; Marín-Hernández & Ortiz-Martínez, 2019; Vitolla et al., 2023) several control variables were introduced representing business capabilities and resources and the effectiveness of the internal corporate governance mechanisms associated with the board of directors; in addition to the effects of time (Year), country (Country) and sector (Industry).

Business capabilities and resources are represented by the following variables: EnvPerf, the score regarding the company's environmental performance according to EIKON; lnAge, the age of the firm calculated by the logarithm of the time elapsed since its creation;

lnsize, the size of the firm expressed by the logarithm of total assets; ROA, economic profitability; Leverage, total ratio of external funds to total assets; R&D, Advertising and CAPEX reflect the intensity of investments in R&D, advertising and capital expenditures with respect to sales, respectively; Instlnve, the percentage of shares held by institutional investors and Analysts, the number of financial analysts that follow the company.

In relation to the board of directors: Bsize determines its size through the number of directors; Bactivity specifies the meetings held by the board during each financial year; Bindep is determined by the percentage of independent directors on the board; CEOduality is a dummy that takes the value 1 to identify that the CEO is also the chairperson of the board, or 0 otherwise; and Bwomen identifies the gender diversity of the board through the percentage of female directors.

5 | RESULTS

5.1 | Descriptives and correlations

Table 2 shows the mean and standard deviation for the variables. On average, multinationals disclose approximately 40% of the 55 items identified as material issues, highlighting specific information on the sustainable use of resources, waste management and climate change.

Table 3 reflects the Pearson correlation coefficients, not identifying the existence of collinearity problems between independent and control variables.

5.2 | Main results

Panel A of Table 4 summarises the results obtained using delayed endogenous models and difference models. In the last column, the elasticities are included to determine the priority that the different European standards, recommendations and framework principles have in the disclosure of environmental information.

In column 1, the estimation of Equation (1) reflects the joint impact of the European institutional pressures derived from the regulatory framework on the disclosure of environmental information, identifying a positive effect for a 99% level of confidence (EUpressures on EnvDiscl: coeff. = 0.160; p -value < 0.01). This impact is confirmed for the delayed endogenous model and relative frequencies (EUpressures on %EnvDiscl: coeff. = 0.00291; p -value < 0.01), as well as for the difference model (EUpressures on EnvDiscl: coeff. = 0.105; p -value < 0.01).

However, the results obtained for Equation (2) show that this effect is only related to the regulations and recommendations regarding non-financial information and the EGD. From an statistical viewpoint, the effect of the framework principles related to the Action Plan on sustainable finance (ActionPlan on EnvDiscl: coeff. = -0.198; p -value > 0.1) and the European commitment to the 2030 Agenda (EU2030Agenda on EnvDiscl: coeff. = -0.000; p -value > 0.1) is



TABLE 2 Descriptive statistics.

	Mean	Standard deviation		Mean	Standard deviation
EnvDiscl	21.315	6.223	Advertising	210.000	196.000
DfaEnvDiscl	0.654	2.095	CAPEX	137.000	120.000
%EnvDiscl	0.388	0.113	InstInve	0.823	0.334
EnvManag	2.697	1.177	Analysts	17.309	8.627
IrresBeh	1.325	0.572	Bsize	11.480	3.527
EnvResources	8.435	2.516	Bactivity	10.041	5.577
Circularity	0.790	0.885	Bindependence	0.507	0.386
Residuals	3.614	1.896	Bwomen	0.190	0.136
CimateChange	3.834	1.293			
Biodiversity	0.622	0.746			
EnvPerf	23.955	8.427			
InAge	3.555	0.843			
InSize	16.339	1.619			
ROA	5.568	7.954			
Leverage	0.785	0.563			
R&D	29.800	5.500			
					%
Directive2014					0.203
Taxonomy					0.029
Guidelines					0.118
GreenDeal					0.059
ActionPlan					0.088
EU2030Agenda					0.147
CEOduality					0.676

irrelevant. These results are robust to changes in the dependent variable and methodological estimation in differences.

The last column of Panel A in Table 4 shows the elasticities for Equation (2), allowing us to determine which European initiative has the greatest explanatory power on corporate transparency in environmental information. Thus, the order of priority would be the EGD, the Taxonomy regulation, the non-binding Guidelines on non-financial reporting, and the Directive 2014/95/EU, with an impact on EnvDiscl of 1.278, 1.130, 0.858 and 0.517, respectively, for confidence levels of 99%.

Panel B shows the results obtained for Equation (2) and the breakdown of the EnvDiscl variable into its different sub-scores. The impact observed for the different standards, recommendations and framework principles discussed above is confirmed, noting that their impact is different depending on the subject of environmental information disclosed. Thus, Directive 2014/95/EU, the Taxonomy regulation, and the non-binding Guidelines on non-financial reporting (2017/C 215/01 and 2019/C 209/01) favourably influence the disclosure of information concerning the environmental management approach, sustainable use of resources, circularity initiatives and climate change. However, they lack statistically relevant incidence for the disclosure of information on irresponsible behaviour, such as

pollution and spills and waste management. Regarding the specific information on biodiversity and animal welfare, a statistically significant impact of the Taxonomy Regulation is observed and, less significant, of the Guidelines on non-financial reporting (2017/C 215/01 and 2019/C 209/01).

As regards the control variables, the most transparent companies are the most environmentally responsible, with a greater presence of institutional investors in their shareholding and less coverage by financial analysts. The impact of the company's resources and capabilities is practically irrelevant, while greater board independence and diversity would be positive for the disclosure of material information on environmental matters.

6 | DISCUSSION

6.1 | Discussion of the results

As the sample under study is made up of multinational companies, their level of disclosure of sustainability information is high since they have the necessary resources and a track record in this field. Furthermore, they are often listed companies that must also comply with the



TABLE 3 Bivariate correlations.

		1	2	3	4	5	6	7	
1	EnvDiscl	1							
2	DfaEnvDiscl	0.19***	1						
3	%EnvDiscl	1	0.19***	1					
4	EnvManag	0.63***	0.18***	0.63***	1				
5	IrresBeh	0.36***	0.03***	0.36***	0.08***	1			
6	EnvResources	0.85***	0.15***	0.85***	0.41***	0.21***	1		
7	Circularity	0.52***	0.14***	0.52***	0.40***	0.14***	0.34***	1	
8	Residuals	0.76***	0.13***	0.76***	0.35***	0.24***	0.52***	0.30***	
9	CimateChange	0.68***	0.13***	0.68***	0.36***	0.26***	0.48***	0.22***	
10	Biodiversity	0.49***	0.04***	0.49***	0.24***	0.21***	0.34***	0.13***	
11	Directive2014	0.18***	-0.01	0.18***	0.22***	0.06***	0.10***	0.22***	
12	Taxonomy	0.16***	0.02*	0.16***	0.24***	0.02	0.07***	0.21***	
13	Guidelines	0.22***	0.10***	0.22***	0.31***	0.04***	0.12***	0.23***	
14	GreenDeal	0.21***	0.11***	0.21***	0.32***	0.03**	0.11***	0.27***	
15	ActionPlan	0.22***	0.10***	0.22***	0.32***	0.03***	0.12***	0.25***	
16	EU2030Agenda	0.22***	0.10***	0.22***	0.31***	0.04***	0.12***	0.23***	
17	EnvPerf	0.73***	0.06***	0.73***	0.51***	0.16***	0.72***	0.32***	
18	InAge	0.19***	-0.02	0.19***	0.09***	0.12***	0.18***	0.08***	
19	InSize	0.33***	-0.01	0.33***	0.27***	0.09***	0.29***	0.27***	
20	ROA	-0.01	0.02	-0.01	-0.02**	-0.05***	0.02**	-0.01	
21	Leverage	-0.08***	0.02	-0.08***	-0.10***	-0.03**	-0.06***	-0.05***	
22	R&D	0.06***	0.00	0.06***	0.00	0.12***	0.05***	0.04***	
23	Advertising	0.03***	0.01	0.03***	-0.04***	0.10***	0.03**	0.02	
24	CAPEX	0.02*	0.01	0.02*	-0.04***	0.09***	0.02	0.00	
25	InstInve	-0.05***	0.01	-0.05***	-0.06***	0.06***	-0.07***	-0.09***	
26	Analysts	0.30***	-0.04***	0.30***	0.19***	0.08***	0.27***	0.25***	
27	Bsize	0.21***	-0.03**	0.21***	0.13***	0.08**	0.17***	0.11***	
28	Bactivity	0.04***	-0.01	0.04***	-0.03***	0.10***	0.01	-0.02*	
29	Bindependence	0.13***	0.01	0.13***	0.21***	-0.04***	0.09***	0.10***	
30	CEOduality	-0.13***	-0.01	-0.13***	-0.08***	-0.05***	-0.13***	-0.10***	
31	Bwomen	0.16***	0.04***	0.16***	0.36***	-0.11***	0.10***	0.19***	
		8	9	10	11	12	13	14	15
8	Residuals	1							
9	CimateChange	0.40***	1						
10	Biodiversity	0.27***	0.30***	1					
11	Directive2014	0.15***	0.06***	0.05***	1				
12	Taxonomy	0.08***	0.09***	0.05***	0.27***	1			
13	Guidelines	0.14***	0.11***	0.07***	0.57***	0.48***	1		
14	GreenDeal	0.11***	0.12***	0.06***	0.39***	0.70***	0.68***	1	
15	ActionPlan	0.13***	0.12***	0.07***	0.48***	0.56***	0.85***	0.80***	1
16	EU2030Agenda	0.14***	0.11***	0.07***	0.57***	0.48***	0.93***	0.68	0.85***
17	EnvPerf	0.50***	0.45***	0.27***	0.18***	0.09***	0.17***	0.13***	0.15***
18	InAge	0.10***	0.16***	0.15***	-0.12***	0.00	-0.02	0.00	-0.01
19	InSize	0.20***	0.22***	0.11***	0.06***	0.04***	0.05***	0.04***	0.05***
20	ROA	0.00	-0.07**	0.04***	-0.04***	-0.05***	-0.02	-0.04***	-0.03**
21	Leverage	-0.04***	-0.08***	0.03***	-0.09***	-0.02**	-0.05***	-0.03***	-0.04***

(Continues)

TABLE 3 (Continued)

		8	9	10	11	12	13	14	15
22	R&D	0.05***	0.04***	0.02**	-0.03***	-0.01	-0.02*	-0.01	-0.02
23	Advertising	0.03***	0.01	0.04***	-0.07***	-0.02*	-0.04***	-0.03**	-0.03***
24	CAPEX	0.02**	0.01	0.03***	-0.07***	-0.02*	-0.04***	-0.03**	-0.03***
25	InstInve	0.00	-0.02	-0.03***	0.00	0.00	-0.01	0.00	-0.01
26	Analysts	0.21***	0.14***	0.12***	0.19***	0.01	0.03**	0.01	0.01
27	Bsize	0.17***	0.16***	0.06***	0.17***	0.03***	0.07***	0.04***	0.06***
28	Bactivity	0.05***	0.06***	0.02*	-0.05***	0.05***	0.01	0.03***	0.02**
29	Bindependence	0.08***	0.05***	0.02**	0.13***	0.06***	0.12***	0.08***	0.11***
30	CEOduality	-0.09***	-0.04***	-0.12***	-0.01	0.01	0.00	0.01	0.00
31	Bwomen	0.06***	0.05***	0.02*	0.34***	0.20***	0.36***	0.28***	0.33***
		16	17	18	19	20	21	22	23
16	EU2030Agenda	1							
17	EnvPerf	0.17***	1						
18	InAge	-0.02	0.15***	1					
19	InSize	0.05***	0.39***	0.07***	1				
20	ROA	-0.02	-0.02*	-0.03***	-0.17***	1			
21	Leverage	-0.05***	-0.11***	0.00	-0.07***	0.03***	1		
22	R&D	-0.02*	0.03**	0.02*	0.07***	0.02**	0.02*	1	
23	Advertising	-0.04***	-0.02	0.02	0.06***	0.03***	0.33***	0.88***	1
24	CAPEX	-0.04***	-0.02**	0.00	0.07***	0.03***	0.42***	0.80***	0.89***
25	InstInve	-0.01	-0.10***	-0.01	-0.09***	0.01	0.03***	0.02**	0.02**
26	Analysts	0.03*	0.30***	-0.05***	0.45***	0.11***	-0.01	0.12***	0.10***
27	BSize	0.07***	0.20***	0.10***	0.44***	-0.11***	-0.10***	-0.02	-0.04***
28	Bactivity	0.01	0.02	0.02	0.12***	-0.11***	0.04***	0.00	0.02**
29	Bindependence	0.12***	0.13***	-0.09***	0.11***	-0.01	-0.07***	0.00	-0.03***
30	CEOduality	0.00	-0.11***	-0.07***	-0.15***	-0.02	0.06***	-0.05***	-0.03**
31	Bwomen	0.36***	0.17***	-0.01	0.09***	0.03**	-0.14***	-0.05***	-0.10***
		24	25	26	27	28	29	30	31
24	CAPEX	1							
25	InstInve	0.04***	1						
26	Analysts	0.10***	-0.08***	1					
27	Bsize	-0.04***	0.02**	0.20***	1				
28	Bactivity	0.06***	0.03***	-0.12***	0.00	1			
29	Bindependence	-0.02	-0.06***	0.10***	0.02**	-0.07***	1		
30	CEOduality	-0.01	0.01	-0.16***	-0.10***	0.07***	0.06***	1	
31	Bwomen	-0.11***	-0.07***	0.07***	0.00	-0.11***	0.26***	0.00	1

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

requirements of market capital supervisors (Ortiz-Martínez et al., 2020; Ortiz-Martínez & Marín-Hernández, 2016). Our first research question concerned the global impact of institutional pressures stemming from the EU regulatory framework on environmental information disclosure. The results depicted in Table 4 reveal a positive effect, indicating that, jointly, the institutional pressures derived from the different initiatives associated with the regulatory framework contribute to increasing the disclosure of environmental information. On average, 40% of the items

considered as material environmental information are disclosed by the sample companies, which indicates that the fact that the European institutional environment clearly and strongly promotes the transition to a more sustainable economy has a positive influence on the transparency of companies in terms of environmental information. This should be valued even more positively, taking into account that materiality depends on each company's specific characteristics since it is defined by its business model, its sector, or its main interest groups, among others, and therefore



TABLE 4 Basic and robust models.

Panel A. Equations (1) and (2)							
	Equation (1)			Equation (2)			Elasticities EnvDiscl coeff. (std. error)
	EnvDiscl coeff. (std. error)	%EnvDiscl coeff. (std. error)	ΔEnvDiscl coeff. (std. error)	EnvDiscl coeff. (std. error)	%EnvDiscl coeff. (std. error)	ΔEnvDiscl coeff. (std. error)	
EnvDiscl(t – 1)	0.853*** (0.00579)			0.854*** (0.00575)			
%EnvDiscl(t – 1)		0.853*** (0.00579)			0.854*** (0.00575)		
EUpressures	0.160*** (0.0183)	0.00291*** (0.000333)	0.105*** (0.0190)				
Directive2014				0.456*** (0.0752)	0.00829*** (0.00137)	0.517*** (0.0786)	0.517*** (0.0786)
Taxonomy				0.864*** (0.195)	0.0157*** (0.00355)	1.130*** (0.204)	1.130*** (0.204)
Guidelines				0.805*** (0.152)	0.0146*** (0.00276)	0.858*** (0.159)	0.858*** (0.159)
GreenDeal				1.356*** (0.194)	0.0247*** (0.00353)	1.278*** (0.203)	1.278*** (0.203)
ActionPlan				–0.198 (0.195)	–0.00359 (0.00354)	–0.329 (0.203)	–0.329 (0.203)
EU2030Agenda				0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
EnvPerf	0.0867*** (0.00419)	0.00158*** (7.62e-05)	0.0194*** (0.00339)	0.0868*** (0.00416)	0.00158*** (7.57e-05)	0.0198*** (0.00337)	0.0198*** (0.00337)
Inage	0.0367 (0.0302)	0.000667 (0.000548)	–0.0701** (0.0312)	0.00182 (0.0302)	3.30e-05 (0.000549)	–0.103*** (0.0313)	–0.103*** (0.0313)
Insize	0.00536 (0.0198)	9.75e-05 (0.000360)	0.00982 (0.0207)	–0.0186 (0.0199)	–0.000337 (0.000361)	–0.0139 (0.0208)	–0.0139 (0.0208)
ROA	0.00618** (0.00309)	0.000112** (5.62e-05)	0.00554* (0.00323)	0.00452 (0.00308)	8.22e-05 (5.59e-05)	0.00361 (0.00322)	0.00361 (0.00322)
Leverage	6.95e-05 (6.08e-05)	1.26e-06 (1.11e-06)	6.23e-05 (6.36e-05)	5.83e-05 (6.04e-05)	1.06e-06 (1.10e-06)	5.11e-05 (6.31e-05)	5.11e-05 (6.31e-05)
R&D	0.000 (1.15e-10)	0.000 (0.000)	–6.25e-11 (1.20e-10)	0.000 (1.14e-10)	0.000 (0.000)	–5.34e-11 (1.19e-10)	–5.34e-11 (1.19e-10)
Advertising	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
CAPEX	0.000 (0.000)	0.000 (0.000)	0.000 (5.04e-11)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
InstInve	0.00151** (0.000724)	2.75e-05** (1.32e-05)	0.000868 (0.000757)	0.00150** (0.000719)	2.73e-05** (1.31e-05)	0.000862 (0.000751)	0.000862 (0.000751)
Analysts	–0.00753** (0.00339)	–0.000137** (6.16e-05)	–0.0181*** (0.00352)	–0.00152 (0.00344)	–2.76e-05 (6.25e-05)	–0.0119*** (0.00357)	–0.0119*** (0.00357)
Bsize	–0.00225 (0.00805)	–4.09e-05 (0.000146)	–0.0168** (0.00840)	0.00797 (0.00807)	0.000145 (0.000147)	–0.00681 (0.00842)	–0.00681 (0.00842)
Bactivity	0.00199 (0.00450)	3.62e-05 (8.19e-05)	–0.00616 (0.00470)	0.000743 (0.00448)	1.35e-05 (8.14e-05)	–0.00707 (0.00467)	–0.00707 (0.00467)
Bindep	0.000962	1.75e-05	0.000190	0.00101	1.83e-05	0.000233	0.000233

(Continues)

TABLE 4 (Continued)

Panel A. Equations (1) and (2)							
	Equation (1)			Equation (2)			Elasticities EnvDiscl coeff. (std. error)
	EnvDiscl coeff. (std. error)	%EnvDiscl coeff. (std. error)	ΔEnvDiscl coeff. (std. error)	EnvDiscl coeff. (std. error)	%EnvDiscl coeff. (std. error)	ΔEnvDiscl coeff. (std. error)	
	(0.000657)	(1.19e-05)	(0.000687)	(0.000652)	(1.19e-05)	(0.000681)	(0.000681)
CEOduality	-0.114** (0.0526)	-0.00206** (0.000957)	-0.0450 (0.0550)	-0.122** (0.0522)	-0.00223** (0.000950)	-0.0530 (0.0546)	-0.0530 (0.0546)
Bwomen	6.07e-05 (0.00203)	1.10e-06 (3.70e-05)	0.000268 (0.00213)	0.00199 (0.00203)	3.62e-05 (3.69e-05)	0.00206 (0.00213)	0.00206 (0.00213)
Country, industry and time controlled							
Constant	1.539*** (0.314)	0.0280*** (0.00572)	0.765** (0.327)	1.994*** (0.317)	0.0363*** (0.00576)	1.216*** (0.330)	
test	60.04***	60.04***	14.75***	60.76***	60.76***	14.20***	
Panel B. Equation (2) for deaggregated EnvDiscl							
	EnvManag coeff. (std.error)	Pollution coeff. (std. error)	EnvResour coeff. (std. error)	Circularity coeff. (std. error)	Residuals coeff. (std. error)	ClimateChange coeff. (std. error)	Biodiversity coeff. (std. error)
EnvManag (t - 1)	0.803*** (0.00841)						
Pollution (t - 1)		0.928*** (0.00457)					
EnvResources (t - 1)			0.772*** (0.00647)				
Circularity (t - 1)				0.861*** (0.00735)			
Residuals (t - 1)					0.861*** (0.00594)		
ClimateChange (t - 1)						0.848*** (0.00619)	
Biodiversity (t - 1)							0.951*** (0.00404)
Directive2014	0.181*** (0.0231)	0.00301 (0.00787)	0.128*** (0.0362)	0.0654*** (0.0176)	0.0218 (0.0304)	0.111*** (0.0221)	0.0107 (0.00909)
Taxonomy	0.140** (0.0600)	0.00510 (0.0204)	0.412*** (0.0939)	0.239*** (0.0453)	0.0386 (0.0788)	0.103* (0.0573)	0.0549** (0.0235)
Guidelines	0.377*** (0.0466)	0.00570 (0.0159)	0.126* (0.0731)	0.113*** (0.0351)	0.0273 (0.0614)	0.0961** (0.0447)	0.0345* (0.0183)
GreenDeal	0.356*** (0.0596)	0.00405 (0.0203)	0.358*** (0.0936)	0.490*** (0.0450)	0.0121 (0.0786)	0.200*** (0.0572)	0.0225 (0.0235)
ActionPlan	-0.0962 (0.0598)	0.000972 (0.0204)	-0.0994 (0.0938)	-0.0120 (0.0450)	0.0180 (0.0787)	0.0225 (0.0573)	-0.00330 (0.0235)
EU2030Agenda	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
EnvPerf	0.0164*** (0.00108)	0.000646* (0.000339)	0.0546*** (0.00201)	0.0048*** (0.000755)	0.0156*** (0.00144)	0.00871*** (0.00102)	0.00142*** (0.000398)
Inage	0.00987	0.00757**	-0.0104	0.00886	-0.0170	0.00490	0.00560

TABLE 4 (Continued)

Panel B. Equation (2) for deaggregated EnvDiscl							
	EnvManag coeff. (std.error)	Pollution coeff. (std. error)	EnvResour coeff. (std. error)	Circularity coeff. (std. error)	Residuals coeff. (std. error)	ClimateChange coeff. (std. error)	Biodiversity coeff. (std. error)
	(0.00918)	(0.00314)	(0.0145)	(0.00694)	(0.0121)	(0.00885)	(0.00363)
Insize	0.00888	-0.00269	-0.0363***	0.0267***	-0.0171**	0.00445	-0.00233
	(0.00611)	(0.00208)	(0.00958)	(0.00463)	(0.00806)	(0.00585)	(0.00240)
ROA	0.000142	0.000123	0.00330**	0.000446	0.00174	-0.00110	0.000174
	(0.000944)	(0.000322)	(0.00148)	(0.000712)	(0.00125)	(0.000906)	(0.000373)
Leverage	3.07e-05*	-3.75e-06	-1.57e-06	1.95e-05	1.16e-05	-1.06e-05	9.85e-06
	(1.85e-05)	(6.32e-06)	(2.91e-05)	(1.40e-05)	(2.44e-05)	(1.78e-05)	(7.31e-06)
R&D	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(5.50e-11)	(0.000)	(0.000)	(0.000)	(0.000)
Advertising	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CAPEX	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
InstInve	0.000309	0.000117	0.000534	-0.000100	0.000398	0.000111	0.000131
	(0.000220)	(7.54e-05)	(0.000346)	(0.000166)	(0.000291)	(0.000211)	(8.69e-05)
Analysts	-0.00285***	0.000394	0.000754	-0.000450	0.00288**	-0.00106	0.000101
	(0.00105)	(0.000357)	(0.00165)	(0.000795)	(0.00139)	(0.00100)	(0.000413)
Bsize	0.000148	0.00111	0.00962**	-0.00416**	0.00431	-0.00106	-0.000342
	(0.00247)	(0.000843)	(0.00389)	(0.00187)	(0.00327)	(0.00237)	(0.000974)
Bactivity	0.000480	0.000337	-0.00104	0.000142	0.000321	-0.000177	0.000420
	(0.00137)	(0.000469)	(0.00215)	(0.00103)	(0.00181)	(0.00132)	(0.000541)
Bindep	0.000799***	4.61e-05	-1.93e-06	0.000374**	-0.000377	0.000380**	-1.89e-05
	(0.000201)	(6.82e-05)	(0.000314)	(0.000151)	(0.000264)	(0.000192)	(7.88e-05)
CEOduality	-0.0126	-0.00537	-0.0467*	-0.0109	-0.0404*	0.00827	-0.0153**
	(0.0160)	(0.00546)	(0.0252)	(0.0121)	(0.0211)	(0.0154)	(0.00633)
Bwomen	0.00539***	-0.000422**	-0.00138	0.00124***	-0.00157*	5.07e-05	-0.000158
	(0.000639)	(0.000214)	(0.000980)	(0.000471)	(0.000823)	(0.000599)	(0.000246)
Country, industry and time controlled							
Constant	0.00442	0.0908***	1.451***	-0.386***	0.529***	0.386***	0.0694*
	(0.0967)	(0.0334)	(0.153)	(0.0735)	(0.128)	(0.0930)	(0.0381)
test	51.22***	27.76***	48.56***	35.59***	39.95***	40.37***	42.88***

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

it could be that some informative items have not been disclosed because they are not material in each specific case (EFRAG, 2021; IFAC, 2015).

Regarding the individual impact of each initiative (second research question), the results indicate that the positive effect is derived fundamentally from the rules and recommendations related to non-financial and sustainability information (Directive 2014/95/EU, EU Taxonomy Regulation, and Communications 2017/C 215/01 and 2019/C 209/01), while, with the exception of the EGD, the effect of the framework principles on sustainability (specifically, the Action Plan: financing sustainable growth, and the European action for sustainability) is statistically irrelevant. These results suggest that the effect of institutional

pressures on the disclosure of environmental information is affected by the rigour and strength of each of the initiatives considered.

Those less-specific initiatives, such as the Action Plan: financing sustainable growth and the European action for sustainability, exert less coercive pressure on companies, since their follow-up is not mandatory but depends on companies' willingness. In contrast, those initiatives with a greater mandatory component and more specific disclosure requirements, such as Directive 2014/95/EU, the Taxonomy Regulation and the non-binding Guidelines on non-financial reporting (2017/C 215/01 and 2019/C 209/01), exert greater coercive pressure on companies.



The third research question sought to establish an order of priority for the different initiatives based on their impact on the dissemination of environmental information. The results in Table 4 indicate that the EGD is the initiative with the greatest explanatory power on corporate transparency in terms of environmental information. This result can be explained because, although the EGD supposes a general strategy or statement of intents, its emblematic character, heralded by the President of the European Commission Ursula von der Leyen as 'Europe's man on the moon moment' (von der Leyen, 2019), and the fact that, as part of it, the European Climate Law (Regulation (EU) 2021/1119 of the European Parliament and of the Council) makes legally binding the political commitment to achieve climate neutrality by 2050 create strong coercive pressures on companies.

It is followed, in order of importance, by the Taxonomy Regulation, the non-binding guidelines on non-financial reporting (2017/C 215/01 and 2019/C 209/01), and Directive 2014/95/EU. Again, these findings are clearly justified by the normative nature of each regulatory instrument. While the Taxonomy Regulation is directly applicable and enforceable in each EU Member State, Directive 2014/95 allowed some flexibility in its transposition into each legal system, leading to heterogeneity and lack of comparability in sustainability reporting, both in its format and content (Caputo et al., 2020). In the case of the guidelines on non-financial reporting (2017/C 215/01 and 2019/C 209/01), the fact that they are recommendations with merely explanatory character diminishes their coercive power with respect to the Taxonomy Regulation.

The high influence of the EU Taxonomy Regulation is striking, considering that it is still 'under construction', since only the measures for the climate change mitigation and adaptation objectives have been developed, and it has not yet entered into force (Paces, 2021). This shows that, as has happened with Directive 2014/95, companies have begun to respond to the disclosure requirements established in the EU Taxonomy Regulation before its effective entry into force (Fiechter et al., 2022). This reveals that the publication of the EU Taxonomy Regulation generates a new 'rule of the game' in the institutional environment to which companies have adapted to obtain legitimacy. Other aspects that may have influenced the EU Taxonomy Regulation are the fact that it focuses on environmental information requirements, the high degree of detail and rigour of its technical criteria and thresholds, which are easy to apply without incurring additional costs, and its focus on investors, who exercise additional coercive pressure (Paces, 2021).

On the other hand, the fact that Directive 2014/95/EU, despite its great relevance, as it constituted the first impulse to regulate the disclosure of information on sustainability in the EU, has less relative influence may be because it is a proposal based on principles, the use of the comply or explain principle, and the absence of specific requirements, including the lack of a clear definition of the concept of materiality, or how it is transposed into the national legislation of the Member States (Beerbaum, 2021; Caputo et al., 2021; Carmo & Ribeiro, 2022; Matuszak & Róžańska, 2021; Posadas & Tarquinio, 2021). To this, we must add that the Directive refers general sustainability information, including environmental and social issues and those related to governance.

Finally, the fourth research question sought to analyse the impact of the different initiatives associated with the EU regulatory

framework on each category of material information on environmental issues. We also found that the impact is different depending on the category of the information, clearly again as a consequence of the different thematic scope of each of the regulations or principles included in our analysis. The Taxonomy Regulation descends to the level of detail in the different areas of environmental information whereas Directive 2014/95/EU establishes a basic framework of sustainability information to be disclosed. Thus, according to the results in Table 4, the regulations and recommendations related to non-financial and sustainability information (Directive 2014/95/EU, the Taxonomy Regulation, and the EC's Communications 2017/C 215/01 and 2019/C 209/01) have a positive effect on the information disclosed in relation to the environmental management approach, sustainable use of resources, circularity initiatives and climate change. Likewise, the Taxonomy Regulation has a statistically relevant impact on the specific information on biodiversity and animal welfare. These results confirm the idea that the impact of regulations on disclosure may vary depending on the category of information in question (Korca et al., 2021). In this sense, the impact of the EU Taxonomy Regulation on the categories mentioned above is justified by its link to the climate and environmental objectives established therein; however, it is noteworthy that, although pollution prevention and control is one of these objectives, the EU Taxonomy Regulation does not have a significant influence on the information in this regard.

6.2 | Research implications

These results have interesting research and practical implications. First, they provide a more complete view of the influence of the EU institutional environment on corporate transparency in terms of environmental information, contributing to the debate on the desirability of regulating the disclosure of sustainability information. Second, this study reflects the effect of coercive pressures on companies arising from the new EU regulatory framework on environmental disclosure, thus confirming the postulates of institutional theory. Moreover, by revealing the existence of different effects for the different initiatives analysed, this study contributes to institutional theory by demonstrating that the effect of institutional pressures on the disclosure of environmental information is not homogeneous but is affected by the characteristics of each initiative. Thus, by highlighting the priority that different European standards, recommendations and framework principles have on the disclosure of environmental information, our results confirm the idea that the influence of institutional pressures varies according to the strength of these pressures, as well as to the expectations of firms in relation to the effects, positive and negative, resulting from the conformity or non-conformity with the new rules of action (Oliver, 1991). Third, the approach adopted in this study focuses on the materiality of the information, determined from the perspective of the double materiality established in the new regulatory framework, instead of analysing the quantity or quality of the environmental information disclosed. This is especially interesting because the changes 'in the way these information requirements are understood could be directly

related to the way in which the principle of materiality is applied in their accounting framework for non-financial or sustainability information' (Baumüller & Sopp, 2022, p. 23).

6.3 | Practical implications

In terms of practical implications, the results could provide guidance to European regulators on the most effective way to promote transparency of corporate environmental reporting and a change in business behaviour in terms of sustainability, which will undoubtedly benefit society. As Eckert (2021, p. 81) points out, with the EGD and the related regulatory framework, the EU aims to play a 'global leadership role in the transition to the EGD' and to become a 'global standard setter'. Our findings provide policy makers with insights to ensure the success of future European and international regulation to promote climate neutrality and transparency on corporate sustainability. In this respect, the results are especially useful considering that the taxonomy is still 'under construction'. Furthermore, the approach adopted in this study to measure the materiality of environmental information can also be considered of practical interest, as companies could use it as a guide to disclose material environmental information so that sustainability reports become proper tools for social responsibility and dialogue with stakeholders.

7 | CONCLUSIONS

Based on institutional theory, this paper analysed the effect of institutional pressures derived from the EU regulatory framework on the environmental information disclosed by companies, both globally and individually. The results obtained for a sample of 832 multinationals for the period 2011–2020 (8320 observations) reveal a positive effect of the European institutional pressures derived globally from the regulatory framework on the disclosure of environmental information, although, at the individual level, this effect is only maintained for the standards and recommendations relating to non-financial information and the EGD, with the effect of the framework principles relating to the Action Plan on sustainable finance and the European Commitment to the 2030 Agenda being irrelevant. In addition, the impact observed for the different initiatives that make up the EU regulatory framework is different depending on the category of environmental information disclosed.

This study has certain limitations that, at the same time, may point the way for future research. Since our objective was to assess the impact of the European institutional environment, we adopted an international perspective instead of limiting ourselves to European companies. This has not allowed us to make comparisons between the Member States or delve into the influence of other coercive institutional pressures derived from the domestic institutional framework of each Member State. Several authors highlight the influence of the characteristics of the company (size and activity sector) and the particularities of each country's regulatory framework on the degree of

response to regulation (Caputo et al., 2020; Ferrer et al., 2020; García-Benau et al., 2022; Sierra-García et al., 2018). It has also been observed that the existence of previous legislation at the national level on disclosure of environmental information and the previous experience of the company in disclosure of information on sustainability affect compliance with Directive 2014/95/EU (Carmo & Ribeiro, 2022; García-Sánchez, Sierra-García, & García-Benau, 2022; Lippai-Makra et al., 2022; Mion & Loza Adai, 2019; Posadas & Tarquinio, 2021). Future studies could address these aspects. Furthermore, although we have considered a broad study period (2011–2020), this time span has not allowed us to analyse the effect derived from the evolution experienced by the European institutional environment in terms of sustainability in the last year on companies' environmental information disclosure practices. Finally, considering the trickle-down effect that regulation can have on firms outside its scope (Ortiz-Martínez & Marín-Hernández, 2022), future studies could focus on small and medium-sized firms.

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