When climate talk does not meet the climate walk: effects of board structure on greenwashing practices

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Abstract

This paper investigates the effect of the board structure on the greenwashing practices of financial companies. The final sample comprised 1,127 financial firms (6,493 observations) from G20 countries over the period from 2016 to 2022. Generalized Least Squares (GLS) and logistic regression models were employed to analyze the data, both across the full period and specifically during the pandemic, to observe variations in greenwashing practices under different economic and social contexts. The results revealed that larger boards were more effective in reducing greenwashing during the pandemic, though this effect was not significant over the full period. Conversely, more independent boards were associated with increased greenwashing practices. Additionally, CEO duality demonstrated a negative relationship with greenwashing. This study contributes to a deeper understanding of the internal mechanisms influencing greenwashing, emphasizing the role of board structure. The findings offer valuable insights for managers, investors, and policymakers, suggesting that larger boards may be more effective in mitigating greenwashing practices during times of crisis.

Keywords: Greenwashing, Board structure, Financial companies, ESG controversies, G20 countries.

1 Introduction

Due to global climate change, the scarcity of natural resources and institutional pressures, companies have aligned their actions with society's demands (Gerged et al., 2023). In this vein, disclosure of sustainability reports has become a recurring practice for companies, transmitting the organization's strategies to its stakeholders (Wahyuningrum et al., 2023). However, the greater the importance of disclosing environmental and social information to stakeholders, the greater the chances of companies disclosing incorrect information about their environmental behavior (Marquis et al., 2016).

Then, greenwashing occurs when a company deliberately decides to disseminate false information. According to Ghitti et al. (2023) state that greenwashing is the divergence between green intentions and green outcomes. One way of greenwashing is selective disclosure, that is, when the company highlights its effective actions for the environment and hides spills and

increased emissions in its reports. In that regard, when companies do not follow their declared social responsibility policies they are committing greenwashing practices (Ioannou et al., 2023).

Given the importance of this hot topic, greenwashing has been discussed frequently, but in very abstract terms (Teichmann et al., 2023). The systematic review by Santos et al. (2023) showed that 69% of papers on greenwashing were published after 2017. This indicates that there is a growing interest in studies on greenwashing, which may be associated with society's growing awareness of the effects of companies on environment. However, most studies look at greenwashing by companies from the US, UK or China, making it necessary to study other countries or economic groups (Santos et al., 2023).

Although the effects of greenwashing practices on corporate reputation, market value and consumer perception are already known, little is known about how the composition of the board acts as an antecedent to this phenomenon (Montgomery et al., 2023). From this perspective, Ghitti et al. (2023) states that there are still few studies on how corporate governance mechanisms drive greenwashing practices. Additionally, adequate measurement of greenwashing behavior, as well as the collection of longitudinal information can contribute to a deeper understanding of greenwashing (Hameed et al., 2021).

In the present study, therefore, we aim to explore the effect of the board structure on the greenwashing practices of financial companies. According to Galletta et al. (2024), the financial sector lacks definitions for what is considered green or sustainable. Although the debate about greenwashing behavior is advancing in non-financial institutions, little is still known about this phenomenon in financial institutions (Birindelli et al., 2024). Furthermore, the financial sector has an important role in combating greenwashing, as it can make lending procedures more environmentally friendly, facilitating the growth of organizations aligned with sustainable development (Stauropoulou et al., 2023).

To achieve our research purpose, we examine three important characteristics of board structure: board size, independence, and CEO duality (Bolourian et al., 2023; Jizi et al., 2014). We analyze the greenwashing practices of 1127 financial companies based in G20 countries, as the rapid economic development of this group has increased pollution and environmental damage (Ma et al., 2023). To test the hypotheses, we use different regression techniques in order to provide greater robustness to the findings, which have important theoretical and practical implications.

This paper expands the research on the mechanisms behind corporate greenwashing, as well as challenges the difficulties of measuring greenwashing. Our findings are particularly relevant for financial institutions, since most studies analyze this phenomenon in non-financial institutions. Furthermore, our results provide new insights for Agency Theory, by showing that the work delegated by the principal to agents can affect the non-financial results of the firm. The results demonstrate that a more diverse board does not always reduce greenwashing

behavior. In addition to these theoretical contributions, our findings are useful for managers, investors, and governments.

This article is structured as follows: In the next section, we present the theoretical foundations and research hypotheses. After that, we present the sample, the definition of the variables and the data analysis. Next, we show the results and in the following section we discuss them based on Agency Theory. Finally, we conclude the paper, highlighting the main limitations and suggesting ideas for future studies.

2 Theoretical Foundation and Hypotheses

2.1 Agency Theory

Agency Theory was developed by Jensen and Meckling (1976) and is based on the principal-agent framework. From this perspective, one party (the principal) delegates work to another party (the agent). In other words, the principal delegates the decision-making power to the agent, who will carry out the activities on his behalf (Fama & Jensen, 1983). Therefore, in this principal-agent relationship, the contract acquires importance, as it will determine the agent's performance in accordance with the principal's expectations.

The efficiency of contracts is necessary for a good relationship between the two parties. According to Agency Theory, the principal and agent have their own economic interests, which can result in conflicts, called agency problems (Eisenhardt, 1989). When agents are not monitored, they act in their own interests to the detriment of the principal's objectives. In this sense, the contract seeks to align the interests of both parties, reducing the opportunistic behavior of agents (Raimo et al., 2021).

The relationship between principal (owner) and management (agents) may have conflicts at the informational level (Köksal & Strähle, 2021). This happens when agents have more information than the principal and use the knowledge to gain personal advantages. Therefore, when one party has more information than the other, informational asymmetry occurs. According to Saam (2007), informational asymmetries arise because the principal is unable to monitor the agent's hidden skills, hidden intentions, hidden knowledge and hidden action.

Additionally, conflicts between principal and agent may arise in relation to risk (Raimo et al., 2021). Agents tend to be risk averse, as risk results in low income for them, as well as the possibility of losing their position. On the other hand, the principal tends to be risk neutral, as its return is diversified. One of the parties needs to take risky actions. In this sense, the principal transfers the risk to the agents when the uncertainty of the outcome is high (Fama & Jensen, 1983).

Therefore, to reduce agency conflicts, the principal must select a suitable agent in order to avoid adverse selection and moral hazard, which occurs when the agent acts in his own interest (Jensen & Meckling, 1976). Furthermore, the relationship between these two parties must be guided by an appropriate contract that balances the different reward objectives: outcome-based versus behavior-based.

In general, Agency Theory literature suggests that the board structure has a control and monitoring function, in addition to helping to mitigate conflicts between management and investors (Fama & Jensen, 1983). In this vein, the appropriate selection of these board members is vital to ensuring correct and accurate financial and non-financial information for stakeholders.

2.2 Hypothesis development

From the Agency Theory viewpoint, a larger number of directors can reduce agency costs (Raimo et al., 2021). On smaller boards, directors can control and monitor management more efficiently, as this improves communication and coordination among board members. On the other hand, larger boards are able to represent different stakeholders. These boards tend to have a greater diversity of skills, knowledge and experiences, as there is greater diversity in the composition of the board (Miranda et al., 2023).

The study by Taglialatela et al. (2024) found that smaller boards tend to have greater environmental disclosure, because they are less bureaucratic and make decisions more quickly. On the other hand, Birindelli et al. (2018) found that larger boards drive greater ESG performance. Additionally, Jizi et al. (2014) and Miranda et al. (2023) found that a larger board positively affects CSR disclosure in American banks and ESG performance in European banks, respectively. Therefore, we propose the following hypothesis:

H1: In financial companies with larger boards, greenwashing practices are lower.

From an Agency Theory perspective, independent directors are less influenced by management and have no personal interests in the firm. They better monitor management, increasing board efficiency and helping to reduce agency problems. According to Croci et al., (2024), greater independence of the board allows the company to not only be responsible to its shareholders, but also to different other interested parties. In this vein, the greater presence of independent directors may favor the disclosure of sustainability information.

The study by Naciti (2019) used a sample of 326 international companies and found that board independence negatively affects corporate sustainability. Ghitti et al. (2023) found that American companies that engage in more greenwashing behavior have more independent boards. On the other hand, Rashid and Hossain (2022) found that greater board independence improves the disclosure of social responsibility information by Bangladesh banks. Therefore, we propose the following hypothesis:

H2: In financial companies with greater board independence, greenwashing practices are lower.

According to Agency Theory, the concentration of power limits the actions of other directors and facilitates the pursuit of personal interests to the detriment of the company and its stakeholders (Davis et al., 1997). CEO duality occurs when a person holds the position of CEO and chairman of the board simultaneously (Croci et al., 2024). In this vein, CEO duality can harm the control system, in addition to reducing the board's independence in monitoring management actions and guaranteeing the interests of investors and other stakeholders.

Empirical studies analyzing the relationship between CEO duality and environmental performance have found mixed results. The study by Jizi et al. (2014) showed that in American

banks, CEO duality is an antecedent of superior corporate social responsibility performance. On the other hand, most studies (Ben Fatma & Chouaibi, 2021; Harun et al., 2020; Ortiz-de-Mandojana et al., 2016) in financial companies have found that CEO duality reduces environmental transparency. Therefore, we propose the following hypothesis:

H3: In financial companies where the positions of CEO and chairman of the board are held by different people, greenwashing practices are lower.

3 Research Design

3.1 Sample

Table I details the number of observations from the initial sample to the final sample. The data of the financial companies cover the period from 2016 to 2022. 2016 corresponds to the year after the 2015 UN Global Compact, in which companies increased their level of environmental disclosure and consequently greenwashing practices (Nicolo' et al., 2024). 2022 corresponds to the most recent year with information available in the Refinitiv Eikon database.

Table I. Breakdown of the sample by country

Countries	Initial sample		Missing data		Final Sample	
	Absolute frequency	Relative frequency	Absolute frequency	Relative frequency	Absolute frequency	Relative frequency
Argentina	63	0.7%	15	0.7%	48	0.7%
Australia	315	3.6%	33	1.5%	282	4.3%
Brazil	126	1.4%	27	1.2%	99	1.5%
Canada	350	4.0%	91	4.0%	259	4.0%
China	882	10.1%	296	13.0%	586	9.0%
France	98	1.1%	18	0.8%	80	1.2%
Germany	175	2.0%	59	2.6%	116	1.8%
India	686	7.8%	445	19.6%	241	3.7%
Indonesia	182	2.1%	102	4.5%	80	1.2%
Italy	161	1.8%	24	1.1%	137	2.1%
Japan	350	4.0%	29	1.3%	321	4.9%
Korea	161	1.8%	19	0.8%	142	2.2%
Mexico	133	1.5%	58	2.6%	75	1.2%
Russia	49	0.6%	35	1.5%	14	0.2%
Saudi Arabia	140	1.6%	49	2.2%	91	1.4%
South Africa	133	1.5%	9	0.4%	124	1.9%
Turkey	175	2.0%	175	7.7%	0	0.0%
United Kingdom	945	10.8%	213	9.4%	732	11.3%
United States of America	3,640	41.5%	574	25.3%	3066	47.2%
Total	8,764		2,271		6,493	

Source: Authors own creation.

According to Table I, of initial sample of 8,764 there was a reduction of 25.91%, leaving a sample of 6,493. The reduction is due missing data. It is relevant to highlight that Turkey did not present data on the government effectiveness index variable. Besides that, the United States of America constitutes 47.2% of the final sample.

3.2 Variables

The variables used in this research are presented in Table II. These variables form the basis for analyzing the relationship between board structure and greenwashing in publicly financial companies. All variables were collected from the Refinitiv Eikon database, except for the government effectiveness variable, which was extracted from the World Bank's Worldwide Governance Indicators.

Table II. Expected relationship

Variable	Explanation of the Variable	Expected Relationship with Greenwashing	Authors
Dependent variable			
Green	ESG score deducted from ESG controversies.	Dependent variable	Ghitti et al. (2023)
Green_Above	A dummy variable is coded as 1 for companies above the median level of greenwashing and 0 otherwise, used to distinguish between high and low greenwashing practices.	Dependent variable	--//--
Independent variables			
Bsize	Total Board Members	Larger boards can represent various stakeholders, bringing together a diversity of skills, knowledge, and experience, which can significantly contribute to the reduction of greenwashing.	Birindelli et al. (2018) ; Miranda et al. (2023) ; Taglialatela et al. (2024)
Bindep	The percentage of independence of the board of directors	More independent boards can reduce greenwashing practices due to increased transparence.	Ghitti et al. (2023); Naciti (2019); Rashid and Hossain (2022)
Dual	Whether the CEO is also the chairman of the board or whether the chairman of the board was formerly the CEO of the company	CEO-chairman duality can reduce environmental transparency and increase greenwashing practices by concentrating power and limiting independent oversight.	Ben Fatma and Chouaibi (2021) ; Harun et al. (2020); Ortiz-de-Mandojana et al. (2016)
Control Variables			
Roa	Return on assets	Companies with higher ROA may be more likely to engage in greenwashing to present both a favorable financial performance and a positive non-financial image.	Li et al. (2023)
Size	Total size of the company's assets, in natural logarithm.	Larger companies may be more motivated to engage in greenwashing to better meet stakeholder expectations and enhance their public image.	Pata et al. (2024)
Leverage	Company's level of indebtedness	Companies with higher levels of indebtedness might use greenwashing practices more frequently to attract third-party capital and investors by improving their perceived financial stability.	Pata et al. (2024); Tan et al. (2024)

Mktval	Market value of the company	Companies with higher market value might engage in more greenwashing practices to improve their reputation and maintain a competitive edge.	Chen and Dagestani (2023)
Effect	Government effectiveness index	A higher index may indicate increased pressure on companies, encouraging them to reduce greenwashing practices.	--//--

Source: Authors own creation.

3.3 Data analysis

We analyzed data using two types of models. The first type was a Generalized Least Squares (GLS) model. To determine the appropriate panel type, the Chow teste, Breusch and Pagan Lagrangian multiplier test, and Hausman test were applied. The results indicated fixed effects within the panel. Following this, the Wooldridge test (for detecting autocorrelation in the residuals) and the White test (for verifying heteroscedasticity) were applied, revealing both issues in the model. The data reveals the presence of heteroscedasticity (White test) and autocorrelation (Wooldridge test). Consequently, the application of GLS models results in more precise confidence intervals and more reliable hypothesis tests. Our data did not exhibit multicollinearity problems, as indicated by the Variance Inflation Factor (VIF), with all variables showing values less than 2. The tested model is represented in Equation 1.

$$Green_{i,t} = \alpha_{i,t} + \beta_1 Bsize_{i,t} + \beta_2 Bindep_{i,t} + \beta_3 Dual_{i,t} + \beta_4 Roa_{i,t} + \beta_5 Size_{i,t} + \beta_6 Leverage_{i,t} + \beta_7 Mktval_{i,t} + \beta_8 Effect_{i,t} + \varepsilon_{i,t}$$

Where: green = variable representing greenwashing, calculated by the difference between the ESG score and the ESG controversies; Bsize = number of people on the board; Bindep = percentage of board independence; Dual = CEO simultaneously chairs the board, or has the chairman of the board was the CEO of the company; Roa = return on assets; Size = company size, in natural logarithm; Leverage = company debt; Mktval = market value of the company; Effect = Reflects perceptions of the quality of public services, the quality of the civil service and its degree of independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.

The second type of analysis involves the application of a logistic model. The dependent variable is Green_ Above, which is coded 1 for companies above the median in greenwashing practices and 0 for below. The model is represented in Equation 2.

$$\text{Green\_Above} = \alpha + \beta_1 \text{Bsize} + \beta_2 \text{Bindep} + \beta_3 \text{Dual} + \beta_4 \text{Roa} + \beta_5 \text{Size} + \beta_6 \text{Leverage} + \beta_7 \text{Mktval} + \beta_8 \text{Effect} + \varepsilon$$

Where: Green_Above = coded 1 for companies above the median in greenwashing practices and 0 for below; Bsize = number of people on the board; Bindep = percentage of board independence; Dual = CEO simultaneously chairs the board, or has the chairman of the board was the CEO of the company; Roa = return on assets; Size = company size, in natural logarithm; Leverage = company debt; Mktval = market value of the company; Effect = Reflects

perceptions of the quality of public services, the quality of the civil service and its degree of independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.

All variables, except Green_Above, were winsorized at the 1% level. Additionality, the Bacon test was applied to identify the presence of a multivariate outliers, but none were detected. For each of the models, four analyses were carried out, considering two periods: i) the full period (2016-2022) and ii) the pandemic period (2020-2021). The first analysis included all G20 countries. The second analysis compared G7 countries with the others, as G7 countries face greater pressure for transparent practices. The third analysis compared the most developed countries (G7) with developing ones (BRICS). In the fourth analysis, the United States of America was excluded since it has practically half of the data, and this may affect the results.

4 Results

4.1 Descriptive analysis

Table III presents the results of the descriptive statistics. The Green variable has a mean of -51.43, which contrasts with the study by Ghitti et al. (2023), where the mean was 17.33.

Table III. Descriptive statistics

Panel A: Quantitative variables					
Variable	Obs	Mean	Standard deviation	Minimal	Maximum
Green	6,493	-51.43	31.55	-90.86	71.62
Bsize	6,493	10.45	3.47	4.00	21.00
Bindep	6,493	68.10	22.58	5.26	100.00
Roa	6,493	0.02	0.06	-0.23	0.28
Size	6,493	23.24	2.22	18.33	28.62
Leverage	6,493	0.75	0.26	0.00	0.99
Mktval	6,493	21.56	1.97	15.10	25.80
Effect	6,493	1.16	0.51	-0.47	1.79
Panel B: Qualitative variables					
Variable	Yes	No			
Dual	33,39%	66,61%			

Source: Authors own creation.

As for the explanatory variables, the results show that the average board size is 10.45, with the smallest board having 4 people and the largest 21. Regarding independence, this variable average is 68.10%, with companies ranging from 5.26% independence to total independence. Concerning CEO duality, 66.61% of the companies do not have CEOs who also serve as chairmen. Additionally, the control variables reveal that, on average, the companies are profitable (ROA = 0.02), have a logarithmic size of 23.24, an indebtedness ratio of 0.75, and a market value of 21.36.

4.2 Multivariate analysis

The results in Table IV show a negative relationship between board size and greenwashing (model GLS) during the pandemic. This suggests that greater boards are more

effective in times of crisis. When considering the full period, the relationship is not significant, indicating that board size does not influence greenwashing practices overall.

Table IV – Regression model for the full sample

Variables	(1)	(2)	(3)	(4)
	GLS	Logistic	GLS	Logistic
Bsize	-0.06	0.01	-0.36***	0.03
	(0.04)	(0.01)	(0.02)	(0.02)
Bindep	0.24***	0.03***	0.25***	0.03***
	(0.01)	(0.00)	(0.00)	(0.00)
Dual	-1.71***	-0.31***	-1.18***	-0.35**
	(0.25)	(0.08)	(0.09)	(0.13)
Roa	10.17***	2.93***	8.01***	5.07***
	(3.01)	(0.60)	(1.30)	(1.16)
Size	6.02***	0.34***	5.61***	0.29***
	(0.14)	(0.04)	(0.06)	(0.07)
Leverage	7.32***	1.04***	10.61***	1.21***
	(0.79)	(0.20)	(0.47)	(0.35)
Mktval	3.00***	0.39***	3.87***	0.38***
	(0.12)	(0.03)	(0.05)	(0.06)
Effect	3.51**	0.02	-20.15***	0.97
	(1.15)	(0.33)	(2.31)	(1.08)
_cons	-287.08***	-18.73***	-263.72***	-19.22***
	(3.24)	(0.72)	(3.01)	(1.73)
Country control	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes
Observations	6403	6493	1976	2100
Chi2	26912.00***	2647.27***	1.3e+06***	771.12***
Groups	1127.00		988.00	

Standard errors in parentheses
* p < 0.05, ** p < 0.01, *** p < 0.001
(1) full period with GLS model; (2) full period with logistic model; (3) pandemic period with GLS model; (4) pandemic period with logistics model
Source: Authors own creation.

The positive relationship between board independence and greenwashing suggests that more independent boards might be more likely to engage in greenwashing practices. This may occur because independent members, seeking to achieve quick results and impress investors, might support initiatives that make the company appear more environmentally friendly than it truly is.

The negative relationship between DUAL and greenwashing suggests that when the CEO also holds the position of chairman of the board, the concentration of power may lead to a reduction in greenwashing practices. This is likely due to greater accountability and direct responsibility of the CEO for both company's operations and its reputation.

The positive relationship between ROA and greenwashing suggests that more profitable companies might be more inclined to engage in greenwashing practices. High profitability can offer the resources and incentives necessary to craft an image of environmental responsibility, even if actual practices do not align with this image.

The positive relationship between company size and greenwashing indicates that companies with larger assets tend to engage more in greenwashing. This may be because larger companies face greater pressure to maintain a green image due to visibility and public scrutiny, leading to a higher incidence of greenwashing practices. Similarly, the positive relationship between leverage and greenwashing indicates that companies with higher levels of debt might use greenwashing to attract investment and improve their perceived stability and corporate responsibility.

The positive relationship between a company's market value and greenwashing suggests that companies might engage in greenwashing to maintain or enhance their valuation. By projecting a greener image, they may attract investors and customers, even if their actual environmental practices are not as strong.

The positive relationship between the government effectiveness index and greenwashing suggests that in environments where the government is more effective, companies may experience greater pressure to project environmental responsibility, leading to increased greenwashing. The negative relationship during the pandemic suggests that, even with effective governance, companies might have prioritized financial survival over maintaining deceptive environmental practices during times of crisis.

4.3 Robustness analysis

Three sensitivity analyses were conducted. The first analysis compared G7 countries with other G20 countries. Table V indicates that board size shows a positive relationship only in non-G7 countries (GLS model). During the pandemic period, the relationship is negative for both G7 and non-G7 countries (GLS model).

Table V. Regression model comparing G7 versus others countries

	Others				G7			
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	GLS	Logistic	GLS	Logistic	GLS	Logistic	GLS	Logistic
Bsize	0.19*	1.01	-0.31***	1.07	-0.07	1.01	-0.41***	1.00
	0.09	0.02	0.07	0.04	0.05	0.01	0.01	0.03
Bindep	0.45***	1.03***	0.55***	1.04***	0.17***	1.02***	0.14***	1.02***
	0.02	0.00	0.02	0.01	0.01	0.00	0.00	0.00
Dual	-2.12***	0.82	0.24	1.07	-2.45***	0.68***	-2.61***	0.63***
	0.64	0.15	0.85	0.37	0.26	0.06	0.09	0.09
Roa	-14.28*	3.32	5.92	307.14~	11.14***	25.78***	6.72***	87.35***
	6.93	4.68	11.84	898.02	3.08	17.59	1.65	113.65
Size	4.70***	1.23***	4.02***	1.17	6.23***	1.50***	6.49***	1.46***
	0.29	0.08	0.33	0.15	0.18	0.07	0.07	0.11
Leverage	1.32	2.29~	11.89***	1.82	7.43***	3.00***	9.44***	3.87***
	2.05	0.97	1.63	1.42	0.90	0.72	0.29	1.56
Mktval	3.26***	1.44***	3.59***	1.57***	3.04***	1.48***	3.70***	1.43***
	0.22	0.10	0.26	0.19	0.16	0.06	0.06	0.10
Effect	0.61	0.88	3.51***	3.21	12.43*	1.17	-228***	1.43
	2.61	0.48	0.88	4.61	5.98	0.93	0.64	2.79
_cons	-229.98***	0.00***	-245***	0.00***	-296.80***	0.00***	0.00***	0.00
	5.96	0.00	3.80	0.00	9.41	0.00	0.00	0.00

Country control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,723	4,680	1,782	4,711	510	1,466	587	1,513
Chi2	347	780			255	733		
Groups	10,636.59***	13,021.72***	517.71***	1,902.02***	92.137,93***	5.61e+07***	184,50***	555.82***

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
(1 and 5) full period with GLS model; (2 and 6) full period with logistic model; (3 and7) pandemic period with GLS model; (4 and 8) pandemic period with logistics model.
Source: Authors own creation.

Independence is positively related to greenwashing in all models and countries, highlighting that greater board independence is associated with increased discretionary practices. This could be because independent members, aiming for quick results, might allow managers to engage in more greenwashing practices. CEO duality exhibits a negative relationship with greenwashing practices in the GLS model for non-G7 countries. In G7 countries, however, this relationship is negative in the GLS models but positive in the logistic model.

The second sensitivity analysis compared G7 countries with BRICS countries, as seen in Table VI. Board size demonstrates a negative and significant relationship only in the GLS model. This relationship is evident during the pandemic period for both economic blocs and throughout the full period only for G7 countries, reinforcing the previously observed results.

Table VI. Regression model comparing G7 versus BRICS

	BRICS				G7			
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	GLS	Logistic	GLS	Logistic	GLS	Logistic	GLS	Logistic
Bsize	0.12	0.99	-0.40~	1.04	-0.05***	1.02	-0.41***	1.02
	0.14	0.03	0.23	0.05	0.05	0.01	0.02	0.03
Bindep	0.55***	1.04***	0.44***	1.06***	0.17***	1.02***	0.14***	1.02***
	0.04	0.01	0.05	0.01	0.01	0.00	0.00	0.00
Dual	-6.12***	0.59*	1.83	1.07	-2.52***	0.64***	-2.53***	0.62***
	1.00	0.13	2.47	0.47	0.25	0.05	0.06	0.09
Roa	-64.82***	0.02~	-51.91***	0.08	11.89***	22.32***	5.72**	79.49***
	9.57	0.05	18.17	0.33	3.15	14.64	2.40	99.57
Size	3.35***	1.25***	-0.11	1.22	6.31***	1.42***	6.76***	1.40***
	0.43	0.11	0.76	0.19	0.18	0.06	0.08	0.11
Leverage	-8.91***	0.39~	8.74~	0.23	7.09***	2.99***	8.23***	3.98***
	3.42	0.22	5.08	0.23	0.89	0.69	0.44	1.56
Mktval	3.37***	1.65***	6.64***	1.89***	2.93***	1.50***	3.48***	1.44***
	0.35	0.15	0.65	0.31	0.16	0.06	0.06	0.10
Effect	19.96***	4.79~	0.00***	4.23	12.68*	1.17	-229.08***	0.86
	6.81	3.84	0.00	8.69	6.02	0.92	0.56	1.65
_cons	0.00***	0.00***	-215.94***	0.00***	-296.91	0.00***	0.00***	0.00***
	0.00	0.00	8.05	0.00	9.82	0.00	0.00	0.00

Country control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,012	1,064	302	365	4,680	4,711	1,466	1,513
Chi2	33,017.68***	286.30***	18,756.73***	107.91***	13,127.31***	1,782.99***	3.77e+07***	524.13***
Groups	213		151		780		733	

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
(1 and 5) full period with GLS model; (2 and 6) full period with logistic model; (3 and7) pandemic period with GLS model; (4 and 8) pandemic period with logistics model
Source: Authors own creation.

Board independence exhibits a positive relationship in all economic models and blocs, reinforcing the previous findings. This indicates that companies with greater board independence are more likely to engage in greenwashing practices. For CEO duality, the GLS model shows a negative relationship, observed throughout the full period for both blocs and during the pandemic for G7 countries. In contrast, the logistic model reveals a positive relationship across all blocs and periods, except for BRICS during the pandemic.

The third sensitivity analysis, which excluded the United States, reveals that board size has a positive relationship with greenwashing, as seen in Table VII. This suggests that in the other G20 countries, larger boards are more likely to engage in greenwashing practices. This result may be attributed to the greater complexity and diversity of interests within larger boards. Furthermore, a larger number of board members can lead to diminished individual accountability, making it easier for deceptive practices to be adopted with less resistance or scrutiny.

Table VII. Regression model without USA

Variables	(1)	(2)	(3)	(4)
	GLS	Logistic	GLS	Logistic
Bsize	0.68***	0.08***	0.58***	0.11***
	(0.08)	(0.02)	(0.03)	(0.03)
Bindep	0.22***	0.02***	0.23***	0.03***
	(0.01)	(0.00)	(0.01)	(0.01)
Dual	-0.65	-0.13	2.65***	-0.13
	(0.57)	(0.14)	(0.39)	(0.25)
Roa	20.45***	0.69	40.16***	0.71
	(3.49)	(0.71)	(4.29)	(1.38)
Size	4.29***	0.10	3.52***	-0.11
	(0.19)	(0.05)	(0.14)	(0.10)
Leverage	21.45***	2.43***	24.28***	2.89***
	(1.09)	(0.28)	(0.72)	(0.49)
Mktval	4.30***	0.56***	5.32***	0.73***
	(0.17)	(0.06)	(0.20)	(0.11)
Effect	5.69***	-0.01	3.02*	0.82
	(1.73)	(0.38)	(1.44)	(1.21)
_cons	-278.03***	-17.07***	-279.97***	-18.33***

	(4.53)	(0.99)	(3.00)	(2.14)
Country control	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes
Observações	3,358	3,427	1,038	1,151
Chi2	15,155.04***	1,511.07***	2.5e+05***	515.66***
Groups	630		519	

Standard errors in parentheses
* p < 0.05, ** p < 0.01, *** p < 0.001
(1) full period with GLS model; (2) full period with logistic model; (3) pandemic period with GLS model; (4) pandemic period with logistics model
Source: Authors own creation.

The positive relationship between board independence and greenwashing indicates that boards with higher independence may be more likely to engage in greenwashing practices. This could be because independent members, in their pursuit of quick results and to impress investors, might endorse initiatives that portray the company as more environmentally responsible than it truly is.

CEO duality exhibited a positive relationship only in the GLS model during the pandemic. This indicates that, during crises, companies experience heightened pressure to demonstrate social and environmental responsibility. CEO duality can facilitate the adoption of strategies, such as greenwashing, to improve the organization's public image and efficiently meet stakeholder expectations. The concentration of power in the CEO can diminish oversight and internal scrutiny, which allows for easier implementation of greenwashing practices with less resistance from the board. Thus, when CEO duality is present, particularly in challenging times, companies may resort to greenwashing as a means to manage public perception and mitigate potential damage to their reputation.

5 Discussion and Theoretical and Practical Implications

The findings allow us to confirm only one of the three research hypotheses. More specifically, the results demonstrate that board size does not matter for greenwashing practices, which does not confirm Hypothesis 1. Furthermore, the results show that more independent directors drive greater greenwashing, rejecting Hypothesis 2. Finally, the findings indicate that when the same person holds the position of CEO and chairman of the board, greenwashing practices are lower, which does not reject Hypothesis 3.

Regarding Hypothesis 1, we predicted that larger boards could provide a greater diversity of knowledge, skills and experiences, which would be a driver for reducing greenwashing practices. However, our findings show that board size is not significant in reducing greenwashing behavior. In this vein, our results differ from previous findings (Birindelli et al., 2018; Miranda et al., 2023).

Therefore, our findings demonstrate that board size does not reduce greenwashing practices. However, for the period of the Covid-19 pandemic, the results show that larger boards can be effective in reducing greenwashing. Although larger boards may have conflicts between subgroups, more members help to understand the interests of different stakeholders, favoring more responsible corporate behavior (Taglialatela et al., 2024).

We reject Hypothesis 2, because the results showed that less independent boards reduce greenwashing practices. This finding is in line with previous studies (Ghitti et al., 2023; Naciti, 2019). According to the Agency Theory lens, we expected that independence would improve board efficiency, as independent members would be better controllers of managers' actions (Fama & Jensen, 1983). In this vein, a greater level of independent members would be able to detect the disclosure of fraudulent environmental and social information (Raimo et al., 2021).

Our findings demonstrate that financial institutions forced to increase board independence increase greenwashing practices. This may indicate that the reduction in greenwashing by companies is partially driven by agency conflict. Independent members do not have personal interests in the company, but they may not be able to mitigate greenwashing behavior if they are not substantially independent.

Finally, our hypothesis 3 can be confirmed, as we predicted that separating the roles of CEO and chairman would be beneficial to reduce greenwashing behavior. The results of the research showed that when the same person holds the position of CEO and chairman, greenwashing is greater, since there is a greater concentration of power (Ben Fatma & Chouaibi, 2021; Harun et al., 2020; Ortiz-de-Mandojana et al., 2016).

This study diverges from the findings of Jizi et al. (2014), who claim that, particularly in the context of financial institutions, powerful CEOs are motivated to reduce the risk of their companies. On the other hand, our study confirms that the combination of roles generates agency problems and leaves much more power in the hands of a single person, which undermines responsible behavior.

In the G7, there is a trend of a negative relationship between board size and greenwashing. This suggests that larger boards present different skills, experiences, and perspectives, which can lead to a more rigorous analysis of the practices adopted by management (Harjoto et al., 2018). Additionally, more people on the board contribute to increased oversight and governance, making it more difficult to adopt greenwashing practices. Independence shows similar results in both blocs, with greater independence tending to increase greenwashing practices. Therefore, when financial institutions are forced to increase board independence, they also increase greenwashing practices. CEO duality tends to reduce greenwashing practices, especially in G7 countries. It is noteworthy that when using the Dummy, this relationship tends to be positive in both groups.

When the US is excluded, the results identified that larger boards increase greenwashing practices, as expected. Therefore, without the presence of this country, the results confirm hypothesis 1. Regarding independence, the results remain similar, that is, increased independence leads to increased greenwashing. Duality shows a positive relationship during the pandemic period (GLS model), while in the full sample, the relationship was negative in all four analyses performed. Thus, the presence of the US has an effect on the results found in banks.

5.2 Theoretical and practical implications

This study enriches the existing literature in different ways. First, we expand the application of Agency Theory by showing the effects of board structure on the greenwashing practices of financial companies. Second, as little is known about greenwashing practices in

financial institutions, this study is pioneering in demonstrating which characteristics of the board structure function as antecedents to mitigating greenwashing behavior. Third, our findings show that the board structure functions as a link to connect the expectations of shareholders and stakeholders, allowing the disclosure of information with greater quality and transparency.

In practical terms, the findings are useful for managers of financial institutions. Companies should be aware that in terms of crisis, a larger board can make it possible to reduce greenwashing. Furthermore, even if the independence of the board has negatively affected greenwashing practices, companies must understand that independent members can more freely express their ideas, which can bring benefits to the quality of the information reported. In turn, CEO duality can reduce unnecessary bureaucracy and make the board more effective by discouraging greenwashing behavior.

In this vein, by reducing the distance between "walking" and "talking", companies can achieve a win-win situation, in which they will have financial and environmental benefits. Policymakers could develop regulations that discourage greenwashing practices by reducing the disclosure of symbolic information. Regulating environmental disclosure practices can be a way to discourage inconsistent narratives that attempt to deceive stakeholders.

Investors have gradually become more attentive to environmental reports, since a greater environmental commitment can reduce risks and increase the company's market value. Therefore, companies must pursue environmental communication that is more consistent with their actions.

6 Conclusion

The purpose of this study was to explore the effect of the board structure on the greenwashing practices of financial companies. A total of 1,127 financial firms from G20 countries were analyzed using different regression techniques to ensure robust results. We focused on three characteristics of the board structure: board size, board independence, and CEO duality. Overall, we reject Hypothesis 1 and 2 and confirm Hypothesis 3.

Our results showed that, during the pandemic, larger boards were more effective in reducing greenwashing practices, except when US companies were excluded. Contrary to expectations, more independent boards were associated with greater greenwashing practices, possibly due to independent directors' desire to show quick results to investors. CEO duality showed a negative effect on greenwashing practices, indicating that power distribution increases accountability and encourages more responsible corporate behavior.

Limitations of this study include the concentration of the sample in financial firms from G20 countries, which may not represent the reality of other sectors or regions. Furthermore, using different metrics for greenwashing practices may yield different results and contribute to the development of the field. The analysis was also limited to certain characteristics of the board of directors, leaving out other possible influencing factors.

As avenues for future studies, we recommend exploring the impact of other board characteristics, such as gender diversity, manager narcissism, board meetings, board age, board members' academic background, among others, on greenwashing practices. Longitudinal studies that track changes in board composition over time can also provide deeper insights.

Finally, the development of more accurate methods to measure greenwashing can close gaps and provide a more comprehensive view of this complex phenomenon.

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