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Does Family Ownership Weaken Corporate Carbon Performance?

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ABSTRACT

This study investigates whether family ownership affects carbon performance among publicly listed firms in Indonesia. The study uses 451 firm-year observations from 2019–2023 from firms that consistently disclose sustainability information. Panel data regression was applied, and robustness is assessed using Coarsened Exact Matching (CEM). The results show that family ownership has a negative and statistically significant effect on carbon performance, indicating that stronger family control is associated with weaker carbon performance and environmental accountability. This suggests that family-controlled firms prioritize internal stability and socioemotional considerations, which reduce incentives for transparent reporting and external scrutiny. However, some family firms may still achieve lower emissions through tighter internal monitoring despite limited disclosure quality. These findings extend agency theory and socioemotional wealth theory by highlighting how ownership concentration shapes sustainability behavior in an emerging-market context. Practically, regulators and firms should strengthen board independence, enhance sustainability oversight, and encourage standardized carbon performance frameworks such as GRI 305 to improve transparency and credibility. The novelty of this study lies in examining the under-researched relationship between family ownership and carbon performance in Indonesian listed firms, thereby enriching the corporate governance and sustainability literature.

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1. INTRODUCTION

In recent years, carbon emissions and environmental sustainability have become pressing global issues (Dharma et al., 2024; Yuliana & Wedari, 2023). Indonesia, as one of the largest carbon emitters in the world, faces increasing pressure to enhance corporate environmental accountability through the Indonesia Stock Exchange (IDX) (Abdullah et al., 2020; Ratmono et al., 2021). Family ownership represents a substantial portion of publicly listed firms worldwide, with families controlling significant equity stakes in one-third of major stock markets (Anderson & Reeb, 2003), demonstrating superior performance in countries such as Chile (Martínez et al., 2007). This prevalence is particularly evident in emerging markets like Indonesia, where family businesses dominate the corporate landscape (Zarefar et al., 2022).

Carbon emission performance has emerged as a key metric of corporate environmental responsibility that is closely linked to climate change mitigation (Rahmawati et al., 2024). The relationship between family ownership and environmental performance presents a complex dynamic, as ownership structure shapes environmental strategies and carbon disclosure practices (Susanto et al., 2024). This study employs multiple theoretical perspectives to analyze the association between family ownership and carbon performance. Agency theory suggests that concentrated ownership allows family owners to align environmental goals more effectively with long-term strategies (Jensen & Meckling, 1976). Meanwhile, socioemotional wealth theory emphasizes that family firms prioritize non-financial objectives, including environmental reputation (Berrone et al., 2010).

The empirical relationship between family ownership and carbon emissions has produced mixed findings. Espinosa-Méndez et al. (2024) report that socially-oriented family firms exhibit superior ESG performance, whereas Qosasi et al. (2022) show that high family control suppresses carbon transparency. These inconsistencies emphasize the need for further investigation in emerging economies where family ownership remains dominant (Jurnali & Septiany, 2022). A meta-analysis involving 40,910 firms reveals the negative impact of family involvement on environmental performance (Miroshnychenko et al., 2022), while cross-country studies show that family firms generate lower carbon emissions (Borsuk et al., 2024). Evidence varies across institutional environments (Graafland, 2020). Findings on corporate social performance are also contradictory (Canavati, 2018), with recent reviews noting inconsistent results across ownership types (Gómez-Mejía et al., 2025).

Studies in Indonesia also reveal a complex pattern. Some evidence suggests that family firms disclose more carbon-related information (Susanto et al., 2024), with a non-linear relationship depending on control levels (Pramono et al., 2023). International studies report better actual emissions performance but poorer qualitative disclosure among family firms (Paganou et al., 2024). Other research highlights that sustainability outcomes in family firms are heavily shaped by institutional contexts and governance mechanisms, resulting in disparities between disclosure quality and actual environmental performance (Baratta et al., 2023; Sun et al., 2024; Waldau, 2024). Although the relationship between family ownership and environmental performance has been widely examined, prior studies have reported inconsistent findings. Some studies suggest that family ownership enhances environmental performance, while others indicate that it reduces carbon transparency and disclosure. Furthermore, empirical evidence on the effect of family ownership on carbon performance in Indonesian publicly listed companies remains limited. Therefore, this study aims to address this research gap by examining the impact of family ownership on carbon performance among companies listed on the Indonesia Stock Exchange.

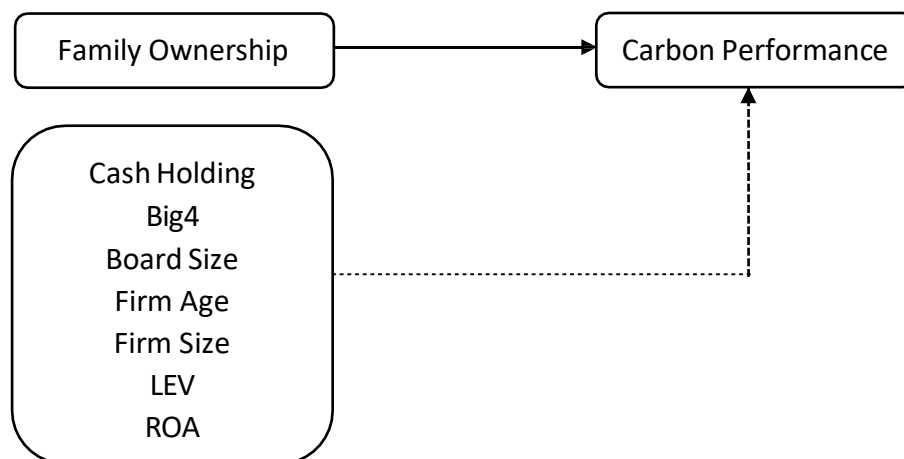
2. METHODS

This study employs a quantitative approach with a causal-comparative design to analyze the effect of family ownership on corporate carbon performance. The research focuses on companies listed on the Indonesia Stock Exchange (IDX) that consistently published sustainability reports during the 2019–2023 period. The selection of the Indonesian context is based on the dominance of family firms in ownership structures and distinct governance characteristics compared to developed countries. Based on these criteria, a total of 451 firm-year observations were obtained as the final research sample. Data were collected from annual reports and sustainability reports available on the official IDX website and corporate websites.

All data were analyzed using Stata 17 software through several stages: descriptive statistics to describe sample characteristics, Pearson correlation to identify relationships among variables, and multiple regression analysis to test the empirical model. Additionally, a robustness check using the Coarsened Exact Matching (CEM) method was conducted to address sample heterogeneity and reduce potential model bias, thereby ensuring more valid and reliable results. Prior to further analysis, all variables underwent a winsorization process applied only to control variables and not to dummy variables (Septiany et al., 2025). This procedure was necessary because the dataset potentially contained extreme values (outliers) that could affect the analysis results. Winsorization adjusts outlier values toward a specific percentile threshold without deleting extreme observations, as the information contained in those values remains important for preserving analytical validity (Syah et al., 2021). The empirical model applied in this study is formulated as follows:

$$CP_{it} = \alpha + \beta_1 FO_{it} + \beta_2 CASH_{it} + \beta_3 BIG4_{it} + \beta_4 BS_{it} + \beta_5 FA_{it} + \beta_6 FS_{it} + \beta_7 LEV_{it} + \beta_8 ROA_{it} + INDUSTRY_{it} + YEAR_{it} + \varepsilon_{it}$$

The equation consists of the dependent variable (carbon performance), the independent variable (family ownership), and a set of control variables including cash holding, Big4 audit, board size, firm age, firm size, leverage, and return on assets, while controlling for industry and year fixed effects. The research model is further illustrated through the conceptual framework presented in **Figure 1**, which visually depicts the relationships among the variables in this study:



Source: Processed by Author 2025

Figure 1. Conceptual Framework.

This study involves three types of variables, namely the dependent, independent, and control variables, each of which is defined in **Table 1**:

Table 1. Variable definition

Variable	Definition	Sources
Dependent:		
Carbon Performance (CP)	The overall level of disclosure made by the company	(Bedi & Singh, 2024)
Independent:		
Family Ownership (FO)	The proportion of shares owned by family directors relative to the total number of outstanding shares	(AL-Duais et al., 2022)
Control:		
Cash Holding (CASH)	Cash and cash equivalents divided by total assets	(Ardianto & Sulaiman, 2024; Liem et al., 2022; Septiany et al., 2026)
Big4 (BIG4)	Dummy variable: assigned a value of 1 if the company is audited by a Big4 public accounting firm, and 0 otherwise	(Qaderi et al., 2024)
Board Size (BS)	Natural logarithm of the total number of directors	(Ivone & Shellen, 2022)
Firm Age (FA)	Number of years since the company was established	(Itan et al., 2025)
Firm Size (FS)	Natural logarithm of total assets	(Yopie & Andriani, 2021)
Leverage (LEV)	Total liabilities divided by total assets	(Anita & Amalia, 2021; Tang & Suwarsini, 2021)
Return on Assets (ROA)	Net income divided by total assets	(Oussii & Jeriji, 2024; Tanujaya et al., 2024)

3. RESULTS AND DISCUSSION

3.1. Descriptive Statistics

Descriptive statistics are statistical methods used to summarize a set of observational data so that the information obtained can be communicated concisely and informatively. Through this approach, researchers are able to present a general overview of the basic characteristics of the research data, such as the mean and standard deviation. Therefore, selecting the appropriate measures is crucial not only to accurately represent the data but also to support the statistical methods employed in hypothesis testing (Mishra et al., 2019).

Table 2 presents the results of the descriptive statistical analysis for all variables in this study. The average carbon performance (CP) score of 3.193 indicates that firms in the sample generally disclose approximately three indicators of carbon-related performance. The maximum value of 7.000 and minimum value of 0.000 reflect considerable variation in the level of carbon disclosure across companies, signaling differences in their commitment to emission management. The family ownership (FO) variable has an average value of 0.675, or 67.5%, indicating that most firms are controlled by family shareholders. The minimum and maximum values of 0.000 and 1.000 illustrate the contrast between family-controlled and non-family-controlled firms. These findings align with the characteristics of publicly listed companies in Indonesia, which remain predominantly family-owned, potentially influencing sustainability disclosure practices, including carbon performance.

Table 2. Descriptive statistics

Variables	Mean	Median	Minimum	Maximum
Carbon Performance (CP)	3.193	3.000	0.000	7.000
Family Ownership (FO)	0.675	0.693	0.000	1.000
Cash Holding (CASH)	1.384	0.109	0.001	112.042
Big4 (BIG4)	0.592	1.000	0.000	1.000
Board Size (BS)	1.768	1.792	1.099	2.639
Firm Age (FA)	3.598	3.738	1.792	4.820
Firm Size (FS)	30.683	30.611	24.532	35.084
Leverage (LEV)	1.878	0.594	0.103	114.117
Return on Assets (ROA)	0.329	0.029	-0.499	25.825

Source: Processed by STATA (2025)

3.2. Pearson Correlation

Table 3. presents the results of the Pearson correlation test, which is a statistical method used to measure the direction and strength of linear relationships between two quantitative variables, with coefficient values ranging from -1 to $+1$. This method is widely applied in social, economic, and financial research to assess the associations among variables prior to conducting regression analysis. [Kitanovski et al. \(2025\)](#), for example, applied Pearson correlation and mutual information to evaluate stock and cryptocurrency portfolio diversification strategies, while [Levantesi et al. \(2025\)](#) examined these relationships in the context of global interactions between cryptocurrency and stock markets. Furthermore, [Esmalifalak and Moradi-Motlagh \(2025\)](#) emphasized that Pearson correlation remains a commonly used technique in analyzing economic and financial variable relationships, demonstrating its versatility across various research settings.

Table 3. Pearson correlation

	[1] CP	[2] FO	[3] CASH	[4] BIG4	[5] BS	[6] FA	[7] FS	[8] LEV	[9] ROA
[1] CP	1.000								
[2] FO	-0.075 (0.111)	1.000							
[3] CASH	0.109** (0.020)	0.053 (0.265)	1.000						
[4] BIG4	0.187*** (0.000)	0.196*** (0.000)	0.091* (0.054)	1.000					
[5] BS	0.168*** (0.000)	-0.024 (0.611)	-0.029 (0.536)	0.098** (0.037)	1.000				
[6] FA	0.111** (0.019)	-0.092* (0.051)	0.065 (0.166)	0.163*** (0.000)	0.353*** (0.000)	1.000			
[7] FS	0.195*** (0.000)	-0.146*** (0.002)	-0.340*** (0.000)	0.144*** (0.002)	0.603*** (0.000)	0.256*** (0.000)	1.000		
[8] LEV	0.110** (0.020)	0.049 (0.303)	0.999*** (0.000)	0.088* (0.062)	-0.024 (0.610)	0.068 (0.150)	-0.332*** (0.000)	1.000	
[9] ROA	0.114** (0.015)	0.053 (0.259)	0.999*** (0.000)	0.099** (0.035)	-0.030 (0.527)	0.069 (0.143)	-0.339*** (0.000)	0.998*** (0.000)	1.000

p-values in parentheses* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: Processed by STATA (2025)

Family ownership (FO) has a correlation coefficient of -0.075 with carbon performance (CP) and a significance value of 0.111 , indicating a negative but statistically insignificant relationship between family ownership and corporate carbon performance. This implies that the extent of family ownership does not exert a strong influence on the level of disclosure and management of carbon performance within firms. In addition, several control variables show significant associations with carbon performance. For instance, Big4 audit affiliation and board size (BS) are positively and significantly correlated with CP, suggesting that firms audited by Big Four auditors and those with larger boards tend to exhibit higher levels of carbon performance disclosure. Meanwhile, other variables such as leverage (LEV) and firm size (FS) also demonstrate positive and significant correlations with CP, indicating that firms with greater scale and financial capacity are more likely to engage in transparent and comprehensive environmental reporting.

3.3. Regression of Family Ownership on Carbon Performance

Table 4. presents the regression analysis results that examine the effect of the independent variables on Carbon Performance (CP).

Table 4. Regression results for carbon performance

	(1) Carbon Performance
Family Ownership	-1.107** (-2.26)
Cash Holding	-0.572 (-1.23)
BIG4	0.879*** (3.58)
Board Size	0.512 (1.45)
Firm Age	-0.372* (-1.80)
Firm Size	0.243*** (2.93)
Leverage	0.235 (0.73)
Return on Assets	1.601 (1.29)
_cons	-5.615** (-2.39)
Industry FE	Yes
Year FE	Yes
r2	0.282
r2_a	0.249
N	451

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: Processed by STATA (2025)

The main regression analysis was conducted to examine the simultaneous effect of independent variables on the dependent variable while controlling for other relevant factors. This method enables the identification of variables that significantly explain variations in Carbon Performance (CP) and the assessment of model strength through the coefficient of determination and statistical significance tests. Such regression approaches are widely used in contemporary research to evaluate relationships involving ownership structure, financial reporting quality, and corporate investment decisions (Amiran et al., 2022).

The results in Table 4 show that family ownership (FO) has a negative and significant effect on carbon performance (CP) at the 5% significance level (coefficient = -1.107 , $t = -2.26$). This finding suggests that higher family control is associated with lower levels of carbon disclosure and environmental accountability, despite the possibility of lower actual emissions due to closer monitoring. This outcome aligns with agency theory, which posits that family-controlled firms tend to prioritize internal stability and control over external transparency. Family owners may perceive carbon performance disclosure as a risk that could invite public scrutiny, leading them to limit environmental transparency. The finding is consistent with prior research (Borsuk et al., 2024). Homroy (2023) and Saeed et al. (2023) also indicated that family firms managed directly by family members typically record lower emission levels compared to those led by non-family CEOs, highlighting the role of family governance and investment in research and development to improve environmental outcomes (Altunbas et al., 2022). Conversely, Qosasi et al. (2022) report that family firms may disclose more carbon information due to strong stewardship commitment, reputation concerns, board oversight by family members, and lower social pressures in certain industries.

Overall, the findings indicate that higher family ownership is associated with poorer and less transparent carbon performance. This reflects the tendency of family firms to restrict environmental disclosure to protect control and internal stability. Although some may achieve lower emissions, their transparency remains limited. This reinforces the role of ownership structure in shaping corporate commitment to climate accountability.

From an accounting perspective, this finding strengthens the role of carbon accounting as a mechanism for environmental accountability. The negative effect of family ownership on carbon performance shows that the quality of carbon-related information is shaped not only by environmental commitment, but also by ownership incentives that influence disclosure choices (Nengzih, 2022). This result implies that accounting is essential in measuring, reporting, and assuring carbon information so that sustainability disclosure becomes comparable, reliable, and useful for decision-making. Therefore, this study contributes to accounting knowledge by showing that ownership structure can affect the transparency and usefulness of non-financial accounting information.

These findings imply that ownership structure plays a critical role in corporate environmental accountability, particularly in Indonesia where family firms are dominant. To enhance legitimacy and public trust, family-controlled firms should strengthen board independence and engage external assurance providers in sustainability reporting. Regulators are also encouraged to enforce mandatory carbon reporting standards, such as those based on the Global Reporting Initiative (GRI 305), to improve transparency across industries.

3.4. Robustness Analysis Using Coarsened Exact Matching Methods (CEM)

The CEM approach was employed to test the robustness of the main estimation results by controlling for sample heterogeneity and contextual conditions that may influence the relationships among variables. Through effect estimation in balanced subsamples, CEM allows researchers to obtain more valid and reliable results while minimizing potential model specification bias (Ripollone et al., 2020). In accounting and finance literature, CEM is increasingly utilized as a robustness check to ensure empirical consistency and strengthen inferential validity.

Table 5. Robustness analysis using coarsened exact matching (CEM)

Panel A: Matching Summary

	0 = Non Family Firms	1 = Family Firms
All	223	228
Matched	223	212
Unmatched	0	16

Panel B: Regression Result

	(1) Carbon Performance
Family Ownership	-1.086** (-2.217)
Cash Holding	0.764 (0.880)
BIG4	0.736*** (2.934)
Board Size	0.377 (1.073)
Firm Age	-0.275 (-1.274)
Firm Size	0.287*** (3.381)
Leverage	0.014 (0.043)
Return on Assets	1.203 (0.981)
_cons	-6.954*** (-2.854)
Year FE	Yes
Industry FE	Yes
r2	0.276
r2_a	0.241
N	435

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: Processed by STATA (2025)

Tabel 5. reports the robustness test using the CEM method to reduce potential endogeneity and examine model stability. Panel A displays matching results, showing that for Group 0 = Non Family Firms, all 223 observations were fully matched, while for Group 1 = Family Firms, 212 out of 228 observations were successfully matched. These outcomes confirm the effectiveness of the matching process in balancing sample characteristics across groups. Panel B shows post-CEM regression results, which remain consistent with the main findings—family ownership continues to have a negative and significant effect on carbon performance, with the model incorporating year and industry fixed effects ($N = 435$; $R^2 = 0.276$). These results confirm that the CEM procedure strengthens the validity and reliability of the findings, as the effect remains stable after adjusting for sample characteristics, thereby reducing endogeneity risk.

4. CONCLUSION

This study investigates the effect of family ownership on carbon performance among publicly listed companies in Indonesia. The empirical findings show that family ownership has a significant and negative influence on carbon performance, indicating that higher family control is associated with lower levels of carbon disclosure and environmental accountability. This pattern suggests that family-controlled firms tend to limit transparency to maintain internal stability and reduce exposure to external scrutiny, even though some may achieve relatively lower emissions through closer internal monitoring. These results support the view that concentrated ownership can weaken sustainability reporting practices and align with prior evidence that strong family control may suppress carbon transparency, while also helping clarify why family firms may perform better in actual emissions but remain weak in qualitative disclosure. A key strength of this study is its robust empirical approach using panel data with comprehensive controls and the application of Coarsened Exact Matching (CEM), which strengthens validity by reducing sample heterogeneity and potential endogeneity concerns.

This study contributes to the accounting literature, particularly in the areas of carbon accounting and sustainability reporting, by providing empirical evidence that ownership structure influences corporate carbon disclosure practices. The findings indicate that higher family ownership is associated with lower carbon performance, reflected in lower levels of carbon disclosure and environmental accountability. These results suggest that carbon-related reporting is influenced not only by a firm's environmental commitment but also by its ownership characteristics. By focusing on carbon disclosure as a form of carbon accounting information, this study provides additional evidence on the determinants of carbon accounting practices in Indonesian listed companies. Therefore, this study extends the carbon accounting literature by demonstrating that family ownership is an important factor affecting carbon disclosure transparency and sustainability reporting practices among Indonesian publicly listed companies. Nevertheless, this study has limitations. Carbon performance is measured using disclosure-based indicators, which may not fully capture actual emission reduction or operational environmental performance. The sample is also limited to publicly listed Indonesian companies, so the findings may not be fully generalizable to private firms or other institutional contexts. Future research may use actual carbon emission data, external assurance indicators, or alternative environmental performance proxies. Further studies may also examine institutional ownership, leadership characteristics, board expertise, or audit committee effectiveness to provide deeper insight into how ownership dynamics shape carbon accounting quality and sustainability accountability.

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