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Sustainable finance and corporate profitability: Do green bond issuances improve financial performance?

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Abstract: This study investigates the effect of green bond issuance on financial performance in the European energy and utility sector. By referencing signalling, stakeholder and institutional theories, the research evaluates whether green bonds are useful financial instruments in addition to their environmental benefits. Using quarterly data from ten leading European energy and utility companies, the study employs before-and-after financial analysis for key profitability metrics – net income margin, gross profit margin, return on equity, and return on assets. The findings reveal mixed results. While one firm shows significant statistical improvement for one financial metric, several firms experienced a decline of financial performance while the rest had no significant changes. The effect size analysis suggests potential practical relevance despite insignificance. The results align with existing literature suggesting that the financial benefits require a longer time horizon for green bonds to materialize. The findings contribute to the evolution of sustainable finance by emphasizing the sector-specific complexity of green bond frameworks.

Keywords: *Green bonds, Sustainable finance, ESG investing*

JEL Codes: *G32, Q56*

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Introduction

In recent years, environmental, social and governance initiatives and their implications for corporate resilience have gathered significant attention from researchers. Scholars have conducted research on such relationships in many sectors, including banking (Miralles-Quirós et al., 2019), airline (Abdi et al., 2022), general corporate (Kanoo et al., 2025), and even cross-sectoral (Kanoo et al., 2025) and cross-regional (Joel et al., 2025) levels. Several research articles mention how investors pay attention to companies that change their operations to more eco-friendly sources. Companies make such transitions by investing in projects that change parts of their global operations to sustainable businesses.

Green bonds are one of the most relevant green transition financial tools in the energy sector. The primary goal of this instrument is to finance sustainable initiatives, such as green transitions, renewable energy, and carbon reduction projects. Due to the heavy impact on the environment of the operations and tension of regulators at both local and continental levels, companies seek such tools for renewable energy projects that impact efficiency and sustainable initiatives (Becsi et al., 2022; Ning et al., 2023).

A critical question for the shareholders and future investors beyond the environmental benefits remains: Do green bonds improve profitability? Researchers analysed the issuance of green bonds and their effect on profitability, cost efficiency, and improved market valuation recently. Flammer (2021) found that companies that announce the issuance of green bonds often get positive feedback from the market based on the signal of commitment to sustainability, improved long-term value, and enhancement of operating performance.

Considering that it is a new financial instrument, it is hard to assess long-term effects and see examples. For both reasons, the area has a limited research base. One of the main gaps in the area is the short-term or immediate effect of green bond issuance on profitability in general. Scholars argue that the instrument may take many years to materialize as the projects behind the allocated funds are long-term in nature (Dorfleitner et al., 2022). Others suggest that the issuance itself is a call for investors for short-term financial resilience. This study aims to fill the gap by examining the profitability metrics before and after the issuance of green bonds in the short term (Lin et al., 2024).

Theoretical background

This study is grounded in signalling, stakeholder, and institutional theory, which are interrelated and collectively inform the relationship between green bonds, ESG, and financial performance.

The green bond issuance serves as a signal of a long-term commitment to ESG initiatives. Flammer (2021) notes that this action primarily reduces information asymmetry and enhances investor confidence.

Regulators, communities, customers, and institutional investors are the stakeholders who value the transparency of ESG reporting and ESG initiatives. Thus, stakeholder theory suggests that firms must consider operating within the range of all interests (Chen, 2024).

Finally, the institutional theory emphasizes formal regulations, industry norms, and broad societal expectations in shaping green practices. The EU green deal, EU taxonomy, and corporate sustainability reporting directive (CSRD) are the regulations in the European context that drive convergence towards ESG frameworks like green bonds (Gauthier, 2013).

The mentioned theories are building a conceptual foundation for the adoption of green finance tools aimed at enhancing firm performance while meeting stakeholders' and regulatory expectations.

Literature review

Global academic discourse addressed the links between ESG and finance. Ali et al. (2025) employ panel data and random-effects regression for non-financial Saudi firms, highlighting the importance of transparent ESG reporting for boosting profitability. Methodologically rooted in stakeholder signalling and legitimacy theory, this work's design and findings guide this study's approach: similarly, the model of how green bond issuance signals commitment and influences financial performance aligns with before and after profitability analysis with the empirical framework.

Aydoğmuş et al. (2022) examine the relationship between ESG performance and financial outcomes by using ESG scores and financial metrics, which this study employs, from over a thousand firms across the globe. The study uses each dimension of ESG to create a fixed effects panel regression. While the environmental dimension had no significant scores due to the longer investment return cycles, the social and governance dimensions had a

positive financial performance effect. The robust sample size and methodological rigor express generalizability of the study, but it remains limited to sector-specific analysis. In certain sectors, there are public and regulatory expectations for green initiatives, such as energy and utilities. Compared to other industries, the energy industry experiences lower costs to finance such instruments, as investors believe that this contributes highly to their environmental metrics (Lin et al., 2024).

Relying on the various reporting practices of global companies results in mixed effects on standardized performance measures for sustainability-related studies. Lámfalusi et al. (2024) analysed ESG practices in the food industry of Hungary, and the findings highlight significant differences and inconsistencies in ESG data quality. Focusing on standardized ESG initiatives, such as green bonds, is eliminating the statistical inconsistencies.

The ESG and performance synergy happen at all levels of businesses. Márkus (2025) outlines efficiency gains from the ESG practices in Hungarian small and medium-sized businesses by applying data envelopment analysis. The study supports that ESG-aligned actions can enhance profitability. On the same level, Gulyás (2024) conducted a survey-based study on ESG adoption, revealing that ESG integration is often driven by compliance and reputational concerns rather than strategic commitments. The study aligns with the theory that ESG disclosures are the signalling mechanisms for external actors such as policymakers and investors.

While the studies do give valuable insight, they exhibit limitations on methodological scope and theoretical depth. Márkus (2025) lacks disaggregated ESG dimensions, limiting the explanatory power of the practices that drive efficiency. The study does not measure the temporal shifts due to the absence of comparable pre- and post-values. While (Gulyás, 2024) highlights the behavioural ESG tendencies, the study does not analyse their impact on financial performance.

Green bonds emerged as sustainable instruments for financing big, environmentally friendly projects recently. In the energy sector, especially due to the environmental footprints, the issuance of the instrument was high. The proceeds of green bonds are allocated to projects such as wind farms, solar power, and hydroelectricity to facilitate a shift from traditional energy generation (Desalegn et al., 2022).

Green bond issuance is also important for government policy developments. Investors are enthusiastic about the issuance of green bonds as it supports eco-friendly activities, promoting transparency and attracting environmentally conscious consumers (Kumar et al., 2024).

Green bonds perform better than traditional financing tools for green initiatives. Alonso-Conde and Rojo-Suárez (2020) use decision-making modelling to show that issuance of the green bonds increased the internal rate of return for shareholders compared to bank loans. A study continues that the issuance of green bonds contributes to debt service coverage, which indirectly means that it improves resilience. Regardless, ESG investing is a gradual process. The rate of investment return is rather a gradual process than an immediate one (Martin et al., 2024).

Various methodological approach exists to assess green bonds and financial performance. Chatterji (2024) uses targeted before-and-after profitability analysis for pre- and post-green bond issuance. The study emphasizes the performance increase in the post-issuance periods. However, the study focuses on the performance of issuing the green bond as a bank. In our case, the focus is on the energy sector leaders to see how owning a green bond framework affects their financial performance.

Khurram et al. (2023) used a similar comparison model to assess the effect of green bonds on several non-financial companies. However, the sector-specific dynamics are not emphasized, while the financial metrics used do not closely resemble the resilience of companies.

The study of green bonds and their impact is relatively new for businesses. Such developing fields have a certain gap in the research that remains. The majority of literature mentions the issuance impact, increased confidence, and better rates of return compared to traditional financing tools (Lin et al., 2024). One of the main gaps in the literature is the short-term effect of green bond issuance. Studies emphasize the long-term nature of the instrument (Dorfleitner et al., 2022).

Certain studies confirmed that there are sectoral differences in how companies align with the new regulatory environment of ESG and goals, as well as green bonds and their impact. However, existing literature lacks comparisons between direct profitability measures and green bonds. Particularly in the energy sector, in which there is are high focus on clean energy transition, green bonds have strong alignment with sustainability goals. Sectoral studies have mixed findings on whether green bonds have mentioned effects (Cheng et al., 2024).

This research will cover a significant gap in the literature by focusing on the effects of green bond issuance on energy and utility companies in the European economic zone. Examination of key indicators of profitability and combining profitability analysis into the issuance of green bonds will provide

empirical and structured evidence for concrete financial outcomes. The study will fill the gap of the other research included in this section by using a specific sensitive sector for analysis, a wide range of quarterly data from leading companies, and strong statistical methodology.

Research question

As most of the other literature has focused, this study will employ a research focus on the financial benefits of a continuous green bond framework. The research question will be:

- Is there a significant difference in profitability indicators before and after green bond issuance among energy sector companies in the short term?

Hypothesis

- This study primarily hypothesizes that profitability metrics (Gross profit margin, return on assets, return on equity, and net income margin) are positively impacted by the issuance of green bonds for European energy and utility companies (Aydoğmuş et al., 2022; Flammer, 2021; Khurram et al., 2023).

According to the hypothesis, the primary profitability metrics will be higher in the post-green bond issuance period compared to the pre-green bond issuance period.

Methodology

Selection of companies and metrics

Ten major players in the European energy and utility market were selected for analysis. These companies are E.ON SE, Ørsted, Électricité de France, Fortum, RWE, Terna Group, Verbund, Enel S.P.A, Engie SA and Iberdrola SA. Companies considered peers in Europe due to their operational scale, market capitalization, and strategic focus (GlobalData, 2024). The selection criteria are below:

- Selected companies are all from the energy and utilities sector, while the main operational focus covers Europe.
- The reporting standards in Europe (IFRS) provide flexibility and transparency for the data and its quality for this study.
- Companies have a solid track record of green bond issuance, as well as publicly available data.
- Selected companies are all sharing leadership positions in the market for renewable energy investments.

E.ON SE is a leader in the energy industry and heavily focuses on renewable energy and decarbonization. The first green bond issuance of the company dates to 2019 (E.ON SE, 2019).

Ørsted is a Danish multinational energy company. They specialise in full green energy solutions such as offshore and onshore wind energy, solar and storage energy solutions, bioenergy, and renewable hydrogen energy (Ørsted, 2025).

Électricité de France is a French multinational energy company. Their sustainable energy solutions produce 94% of the energy free from CO_2 emissions (EDF, 2025).

Fortum OYJ is a Finnish energy company. Their energy production reached 99% free from CO_2 as of the 2024 year-end (Fortum, 2025).

RWE AG is a German multinational energy generation and trading company focusing on all kinds of renewable energy production and aims to be carbon-neutral until 2040 (RWE, 2025).

Terna Group is an Italian energy transmission grid manufacturer. Their aim is to develop carbon-friendly energy equipment for plants that reduces emissions significantly (Terna, 2025).

Verbund AG is the largest electricity provider in Austria. Over 90% of the electric generation is provided from hydro power (Verbund, 2025).

Enel S.P.A. is an active issuer of green bonds. An Italian company has a portfolio of renewable energy projects worldwide. The first green bond issuance of the company dates to 2017 (Enel SPA, 2017).

Engie SA is a French global energy company that heavily focuses on reducing carbon emissions. The company issued several green bonds for green energy projects. The first green bond issuance of the company dates to 2014 (Engie SA, 2024).

Spanish company Iberdrola S.A. is one of the largest renewable energy producers globally. The company is actively issuing green bonds to finance

clean energy initiatives. The first green bond issuance of the company dates to (IBERDROLA, 2024).

The latest key financials of the companies are shared below (Table 1):

Table 1: Key financial indicators of selected companies.

$MM	Total Revenue	EBITDA	Net Income	Total Assets	Market Capitali-zation	Enterprise Value
E.ON SE	88,404.17	12,848.17	6,017.30	115,292.47	47.63	96.77
Electricité de France S.A.	128,405.93	32,835.52	12,823.28	378,098.15	Not disclosed	Not disclosed
Enel SpA	81,906.52	20,043.61	8,902.62	193,745.73	95.75	186.11
Engie SA	79,854.23	14,622.42	5,380.09	196,235.64	56.25	104.92
Fortum Oyj	6,274.79	1,621.71	1,254.96	17,918.00	16.43	17.26
Iberdrola, S.A.	48,401.32	17,918.84	6,434.90	163,881.35	119.89	203.76
Ørsted A/S	10,303.21	3,386.39	2.32	41,478.12	18.84	31.22
RWE Aktieng-esellschaft	26,206.97	9,153.61	5,721.96	101,915.31	30.49	46.66
Terna S.p.A.	3,954.09	2,736.35	1,149.48	28,146.39	20.33	33.37
VER-BUND AG	8,934.06	3,740.81	2,314.86	19,379.14	26.50	29.13

Source: S&P Capital IQ pro portal, screener tool.

Profitability metrics assess the ability of income from available assets and ongoing operations. For assessing the impact of green bond issuance on the profitability of the selected companies, a study focuses on a four-set of financial metrics that align with the research question.

Gross profit margin measures the ability to manage costs related to the core operations. The metric indicates how efficiently a company is in managing products or services before expenses and taxes. Metrics will be used

to understand how issuance improves cost structure and operational efficiency, hence making it an important performance indicator for this research (Andrianto & Amin, 2023).

Return on assets (ROA) evaluates how the total assets are utilized for net income generation. This metric will help to understand how capital injections, such as green bond issuance, improve asset efficiency.

Return on equity (ROE) assesses the profitability of shareholders. The metric measures net income from the perspective of each unit of equity. Metrics will help to understand the long-term projectile of financial sustainability.

ROA and ROE are considered an effective way to measure profitability compared to EBITDA and related metrics in such cases (Verriest et al., 2018).

Net income margin represents the final profit after all expenses. This metric will be the bottom line of financial performance to understand the green bond effects. Ratio has a significant positive effect on profit growth, making it one of the main profitability indicators (Handayani & Srihadi, 2020).

Data structure and variables

The data set used in the research consists of financial data from the selected companies. Financial data were sourced from the S&P Capital IQ platform, which is a direct source for financial reports of selected companies. All financial indicators used in the analysis are from the quarterly reports to ensure more granular data with an increased number of observations per company. This method also helps to identify trends more precisely.

The dataset was further edited to categorically include pre-green bond periods and post-green bond periods, allowing for comparative assessment of the effects. Periods differ for each company due to their first issuance and are categorized as below (Table 2).

Considering that the companies issued their first green bond in different fiscal years before and after profitability analysis was conducted for each case, accordingly. For further strengthening the statistical results, the dynamic treatment effect estimated on each key metric was included in the analysis (Miller, 2023; Sun & Abraham, 2020).

The fiscal year data used in the research might indicate the possibility of external factors affecting financial metrics such as inflationary shifts, regulatory changes, and financial crises. To mitigate such effects on the dataset, each company was analysed relative to its financial history. This method

aligns with established before-and-after profitability analysis to help reduce the exposure of external market effects (Kothari & Warner, 2007).

Table 2:The published green bond framework of each company.

Company	Issuance Date	Issuance Quarter
E.ON SE	April–August 2019	FQ2 2019
Engie SA	April–June 2014	FQ2 2014
Enel SpA	March 14, 2017	FQ1 2017
Iberdrola, S.A.	April 2014	FQ2 2014
Ørsted A/S	November 16, 2017	FQ4 2017
Terna S.p.A.	July 16, 2018	FQ3 2018
VERBUND AG	November 13, 2014	FQ4 2014
EDF SA	November 20, 2013	FQ4 2013
RWE AG	June 2021	FQ2 2021
Fortum Oyj	May 2015	FQ2 2015

Source: S&P Capital IQ Pro, screener tool, securities market data based on ISIN identifier.

For the Covid periods (between 2020 fiscal quarter 1 and 2021 fiscal quarter 2) dataset does not include any figures as this period is associated with lowered financial characteristics for all the subject companies. This window is selected based on the consensus in financial literature. The dataset continues from the end of the pandemic, where companies gain momentum, ensuring that the analysis is not conflated with pandemic-related anomalies (Holston et al., 2023).

Analysis methods

Given the nature of the dataset and the objective to measure financial performance, paired difference testing was chosen. The method enables to comparison of firm performance over time while firm-specific characteristics remain stable. For the normality of each metric Shapiro-Wilk test was used, and accordingly, either paired t-tests or Wilcoxon signed-rank tests were applied. The approaches chosen are suited for within-firm change identification and small-sample studies where heterogeneity between firms makes total level analysis problematic.

While regression-type assessments, such as difference-in-difference models, offer better control for exogenous factors, the heterogeneity and time trends of this study did not adopt those methods. First, the green bond framework for each company occurred in different quarters, making the sample size uneven. Second, nearly the whole energy and utility sector is influenced by sustainable strategic market tools, such as sustainable-linked bonds and exposures. And finally, the goal of the study was to keep a firm-specific focus rather than the whole sector.

To enhance the significance, this study will employ measures of practical significance. For paired t-tests, Cohen's d will be calculated to quantify the magnitude of changes. For non-parametric comparison, the rank-biserial correlation coefficient will be reported. These measures will evaluate the credibility of the results.

Normality testing

For the selection of comparison tests, normality for each financial metric was analysed. The Shapiro-Wilk test was conducted for each financial resilience metric for each company. Most of the test metrics were concluded as not normal. However, below cases were normal (Table 3):

Table 3: Shapiro-Wilk normality testing for the determination of before-after analysis type.

Company	Metric	Shapiro-Wilk p-value	Normal Distribution
Enel S.p.A.	Return on Assets	0.084	yes
Iberdrola S.A	Net Income Margin	0.083	yes
Fortum Oyj	Gross Profit Margin	0.134	yes
Ørsted A/S	Return on Assets	0.84	yes
RWE AG	Return on Assets	0.079	yes
RWE AG	Gross Profit Margin	0.856	yes
Terna S.p.A.	Return on Assets	0.495	yes

Source: Author's calculations.

For normally distributed metrics paired t-test will be conducted; for the other metrics, a Wilcoxon signed-rank test will be conducted. This method will make it possible to analyse profitability metrics before and after the green bond framework for each company.

Analysis and results

Conducted tests for normally distributed financial metrics indicated three significantly reduced profitability and three non-significant reduced profitability. Only one, return on assets for RWE AG, was significantly increased after the green bond framework application (Table 4).

Table 4: Paired t-test results. * p < 0.05.

Company	Metric	t-stat	p-value	Significant
Enel S.p.A.	ROA	-0.5	0.62	No
Iberdrola S.A	Net Income Margin	-2.4	0.023	Yes
Fortum Oyj	Gross Profit Margin	-13.5	0	Yes
Ørsted A/S	ROA	1.16	0.259	No
RWE AG	ROA	3.5	0.004	Yes
RWE AG	Gross Profit Margin	1.11	0.285	No
Terna S.p.A.	ROA	-3.12	0.005	Yes

Source: Author's calculations.

Cohen's d robustness check for each metric assessed (Table 5).

Table 5: Cohen's d robustness check results.

Company	Metric	t	n (pairs)	Cohen's d	Effect Size
Enel S.p.A.	ROA	-0.5	32	-0.088	Negligible
Iberdrola S.A	Net Income Margin	-2.4	28	-0.454	Medium
Fortum Oyj	Gross Profit Margin	-13.5	34	-2.315	Very Large
Ørsted A/S	ROA	1.16	24	0.237	Small
RWE AG	ROA	3.5	15	0.904	Large
RWE AG	Gross Profit Margin	1.11	15	0.287	Small
Terna S.p.A.	ROA	-3.12	21	-0.681	Medium-Large

Source: Author's calculations.

The results of paired t-tests reveal mixed financial impacts. Among the seven metric combinations, only RWE AG exhibits statistically significant improvement backed by a large effect size for ROA. Iberdrola S.A. and Fortum OYJ show a statistically significant decline, with a large, substantial decrease

in cost efficiency. Terna S.p.A. reports a significant reduction in ROA with a medium-large effect. The remaining tests were not statistically significant and show negligible to small effect sizes. This implies a limited short-term financial impact from the green bond framework.

All in all, the findings indicate that while green bonds positively influence financial performance, for RWE, the immediate effect in post post-period does not consistently express improved profitability. The results support the view that the financial effect may require longer periods to materialize. For the non-normal variables Wilcoxon signed rank test was applied with Tables 6 and 7.

Table 6: Wilcoxon signed rank test results (p<0.05).
***Paired t-tests conducted. **-statistically significant.**

	Gross profit margin	ROE	ROA	Net income margin
E.ON SE	Z=0.12; p>0.5	Z=-0.1; p=0.5	Z=-0.7; p=0.26	Z=0; p>0.5
EDF SA	Z=4.3; p>0.5	Z=3.6; p>0.5	Z=3.5; p>0.5	Z=2.3; p>0.5
Enel S.p.A.	Z=-0.1; p=0.47	Z=-1.5; p=0.06	*	Z=-0.5; p=0.31
Engie SA	Z=5.16; p>0.5	Z=2.7; p>0.5	Z=3.9; p>0.5	Z=2.6; p>0.5
Fortum OYJ	*	Z=1.8; p>0.5	Z=4.1; p>0.5	Z=2.7; p>0.5
Iberdrola	Z=-1.4; p=0.09	Z=3.8; p>0.5	Z=3.1; p>0.5	*
Ørsted A/S	Z=-1.1; p=0.14	Z=-0.7; p=0.24	*	Z=-0.5; p=0.32
RWE AG	*	**Z=-2.1; p=0.017	*	Z=-0.8; p=0.21
Terna S.p.A.	Z=3.9; p>0.5	Z=2.9; p>0.5	*	Z=1.7; p>0.5
Verbund	Z=3.1; p>0.5	Z=1.4; p>0.5	Z=0.4; p=0.66	Z=-0.1; p=0.44

Source: Author's calculations.

The results indicate that only RWE AG (ROE) had statistically significant post-issuance improvement with a large effect size. Enel S.p.A also demonstrated a positive trend while having a medium-small effect size. Although statistical significance was not achieved across most observations, some indicators consistent positive rank-biserial correlation. While these findings suggest that green bond issuance may be associated with improved post-issuance profitability, the effect appears heterogeneous across companies and financial indicators. The existence of such effect sizes, regardless of limited significance, highlights the potential economic relevance of such shifts.

Hence, further longitudinal research in the future, when bonds will mature, will be necessary.

Rank biserial correlation analysis for the dataset assessed (Table 7).

Table 7: Rank-biserial correlation analysis results for robustness check of Wilcoxon signed-rank test results. *Paired t-test conducted.

	Gross Profit Margin	Net Income Margin	ROA	ROE
EDF SA	-0.85	-0.62	-0.57	-0.8
Enel S.p.A.	0.03	0.03	*	0.21
Engie SA	-0.97	-0.34	-0.75	-0.46
E.ON SE	0.31	0.37	0.11	0.06
Fortum OYJ	*	-0.24	-0.8	-0.08
Iberdrola	0.23	*	-0.68	-0.84
Ørsted A/S	0.35	0.05	*	0.22
RWE AG	*	-0.26	*	0.72
Terna S.p.A.	-0.98	-0.31	*	-0.75
verbund	-0.74	0.08	-0.05	-0.28

Source: Author's calculations.

Limitations

For contextualizing the findings and guiding future research, several limitations should be acknowledged.

First, the analysis covers mixed time perspectives, as some companies issued green bonds very early and some in recent years. Despite being a long-term project financing tool, the study is limited by the dataset that is available as of now. It is possible that immediate financial results may not fully capture the whole value of initiatives. Current literature also suggests that the green bond frameworks might give positive signals to market participants, but tangible financial benefits take time to materialize.

Second, the scope of the study is sector and region-specific. The dataset consists of quarterly financial metrics of ten major energy and utility firms in Europe. Though this allows for the subject of similar companies that are tied to the same regulator, it limits the generalization of the findings to other markets. The timing of the green bond framework announcements is also different. This situation introduces unobserved heterogeneity related to macroeco-

nomic conditions, investors, and policies. For mitigating this, firm-level before and after analysis helps, but the residual contextual effects cannot be ruled out.

Further, the analysis only incorporates financial metrics. Several other metrics-stock price reactions, investor sentiment, and bond yields are also central in existing green finance literature. Additionally, while the analysis focuses on profitability, environmental outcome measures are not included in the green bond analysis. There is growing concern around "greenwashing". Future studies may cover the credibility of ESG claims, performance-related bond disclosures, and emission reductions to close the gap.

Finally, there are more advanced statistical tests that can provide better perspectives, such as difference-in-difference analysis and matched panel data regression analysis. Due to the sample size and timing variability across companies, they were not feasible. More years of data will be available in the future, which will enable the employment of more methods to strengthen causal inferences and tackle heterogeneity.

Discussion

This study explores whether green bond issuance improves profitability among leading European energy and utility companies. The results offer mixed evidence. Only one company, RWE AG, demonstrated statistically significant improvement for one out of four financial metrics, with a large effect size, indicating better operational efficiency during the post-green bond framework period. On the other hand, Fortum Oyj, Iberdrola S.A., and Terna S.p.A. recorded significant declines, particularly in ROA and gross profit margin. The rest of the companies had no statistically significant change.

These findings align with the arguments that Dorfleitner et al. (2022) and Martin et al. (2024) suggest. Green bonds are more strategic, long-term investments than immediate financial tools. The fact that only one firm had statistically significant positive results is neither immediate nor uniform. This outcome supports theoretical framing under signaling and institutional theory. The green bond framework may send a positive signal to stakeholders, but that does not mean short-term financial returns.

Comparison with previous research

This study extends earlier research that generally finds a positive relationship between financial performance and ESG initiatives. Unlike previous work, this study focuses on direct firm-level profitability metrics within a single sector.

While Khurram et al. (2023) document profitability improvements after the green bond framework, the research includes different sectors. Chatterji (2024) notes the same, but the analysis is from the perspective of the issuer. This study focuses on a single sector, confirming heterogeneity of green bond impacts and emphasizing that sectoral and firm-level contexts also matter. The financial performance not only connects to issuance but also to the timing of the projects that are related to, the deployment of raised capital, and the ESG intent of the company.

The results of this study underscore the argument by Aydoğmuş et al. (2022) and Lin et al. (2024) that environmental projects often have delayed returns. This suggests that while green bond frameworks boost reputation, they do not necessarily boost returns.

Conclusion

The empirical results of the study offer mixed and non-generalizable evidence. While one of the firms demonstrated a statistically significant improvement for ROA, other firms either showed no significant change or experienced a decline in metrics. Effect size calculations show that, where statistical significance was absent, some firms exhibited moderate changes that might mean practical relevance.

From a methodological standpoint, the study is exploratory. The small sample size, lack of control over macroeconomic variables, and reliance on relatively simple statistical tests limit the validity and generalizability. While paired tests and robustness checks are applied, the absence of more advanced techniques constrains the strength of causal inference.

The results do not support the hypothesis that green bond issuance improves profitability in the short term. Rather, the findings suggest that the financial benefits are likely to be delayed. This is due to the long-term nature of the projects. This aligns with institutional and signaling theories. Green initiatives may enhance reputation, but they do not mean immediate improved financial performance.

Future research will be able to refer to the extended time horizon. It should incorporate broader financial and non-financial indicators and employ more robust statistical techniques. Additionally, future research should employ comparative studies across geographies and sectors to observe the moderation of the financial impact. For the development of green finance studies, more comprehensive datasets and longitudinal analyses will be essential to validate the insight that this study offers.

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