Online-Appendix

„The Impact of Profitability on Scope 1, 2 and 3 GHG Emissions in Europe"

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Appendixes

Appendix 1: Excel File: Master_Thesis_Appendix1_YHohenstein.xlsx

Regression:

- Regression_DATA
- PythonCode_Regression
- PythonCode_Trend
- Hypotheses 1-4 Regression Results (including Python Outputs)

SLR:

- Search Strategy (including Query)
- In-Depth Review
- SLR Analysis

Appendix 2: Overview of Scope 1, 2 and 3 GHG Emissions

Table 1: Median Growth Rates per Year, per Scope

Emission Types	2017	2018	2019	2020	2021	2022	2023
Scope 1	1.12%	0.00%	-2.03%	-8.89%	2.34%	-1.68%	-4.98%
Scope 2	-3.92%	-4.46%	-5.09%	-10.45%	-5.95%	-4.05%	-4.19%
Scope 3	1.63%	3.90%	1.45%	-10.28%	4.13%	7.96%	0.83%

Figure 1: Average Total Emissions vs. Revenue (2017-2023)
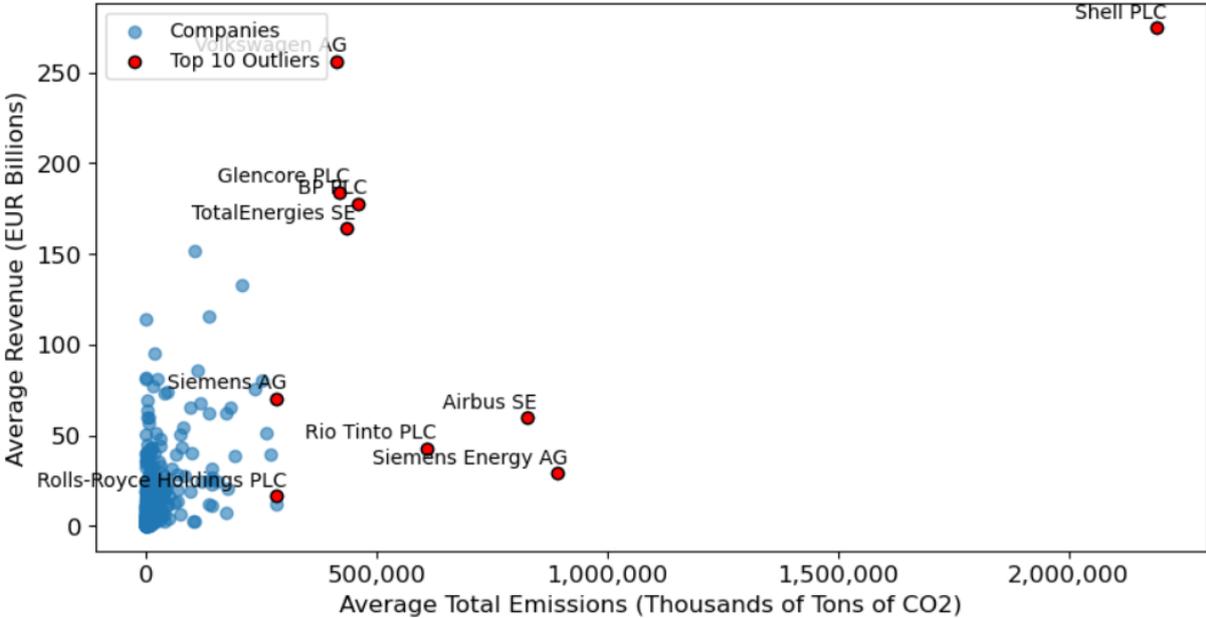
Appendix 3: Fixed-Effect Assumption Tests

Figure 2: Low-Emission-Sectors Scatter Plots - Linearity
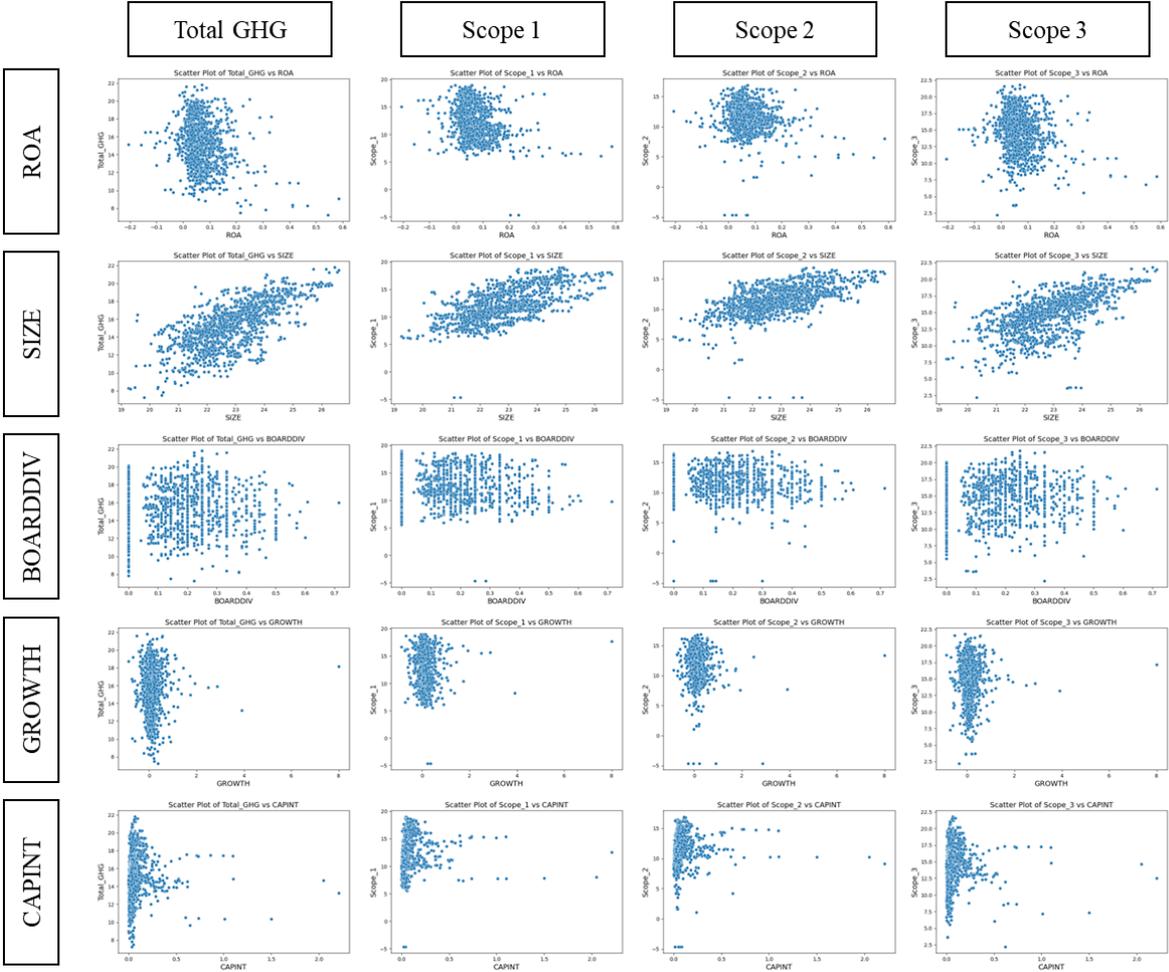
# Figure 3: High-Emission-Sectors Scatter Plots - Linearity
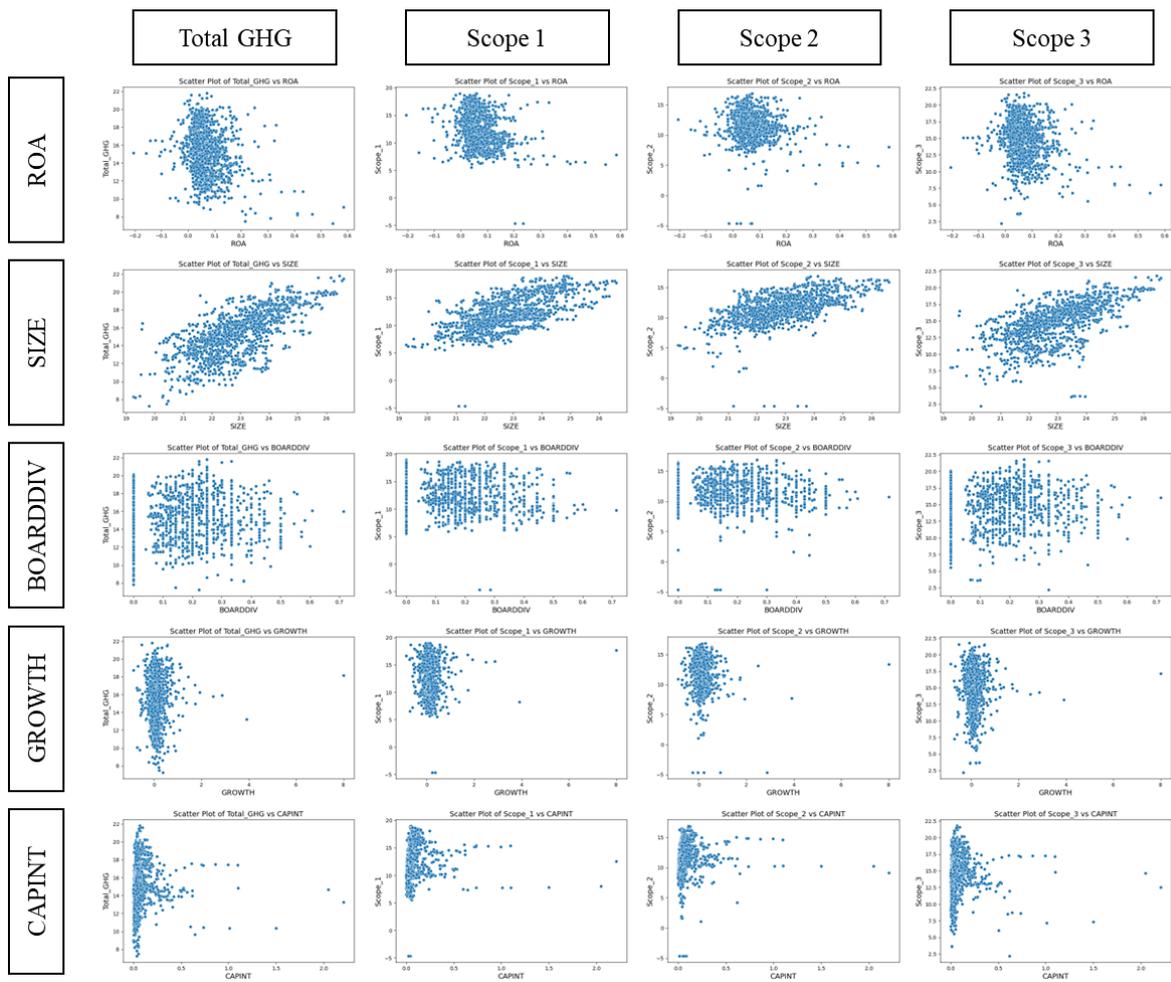
Table 2: Variance Inflation Factor - Multicollinearity

Indepent Variables	VIF
ROA	1.085
SIZE	1.055
BOARDDIV	1.037
CAPINT	1.027
GROWTH	1.018

Table 3: Breusch-Pagan Test - Heteroscedasticity

Sector Type	Hypothesis	Lagrange Multiplier Statistic	p-Value (LM)	F-Statistic	p-Value
Low-Emission-Sectors	Hypothesis 1	5.86	0.32	1.17	0.32
	Hypothesis 2	11.99	0.03	2.41	0.03
	Hypothesis 3	8.50	0.13	1.70	0.13
	Hypothesis 4	46.31	0.00	9.57	0.00
High-Emissions-Sectors	Hypothesis 1	28.85	0.00	5.88	0.00
	Hypothesis 2	31.33	0.00	6.39	0.00
	Hypothesis 3	11.29	0.05	2.27	0.05
	Hypothesis 4	12.75	0.03	2.56	0.03

Table 4: Hausman Test - Endogeneity

Sector Type	Hypothesis	Hausman Test Statistics	p-Value
Low-Emission-Sectors	Hypothesis 1	21.44	0.00
	Hypothesis 2	125.74	0.00
	Hypothesis 3	58.24	0.00
	Hypothesis 4	21.17	0.00
High-Emissions-Sectors	Hypothesis 1	3.47	0.75
	Hypothesis 2	6.14	0.41
	Hypothesis 3	103.41	0.00
	Hypothesis 4	11.42	0.08

Table 5: Durbin Watson Test - Autocorrelation

Sector Type	Hypothesis	Durbin-Watson Statistics
Low-Emission-Sectors	Hypothesis 1	1.76
	Hypothesis 2	1.96
	Hypothesis 3	1.88
	Hypothesis 4	1.78
High-Emissions-Sectors	Hypothesis 1	1.56
	Hypothesis 2	1.50
	Hypothesis 3	1.61
	Hypothesis 4	1.62

Table 6: Wooldridge Test - Serial Correlation

Sector Type	Hypothesis	Coef. of Lagged Residuals	t-statistic	p-value
Low-Emission-Sectors	Hypothesis 1	0.15	4.66	0.00
	Hypothesis 2	0.02	0.91	0.36
	Hypothesis 3	0.12	3.66	0.00
	Hypothesis 4	0.16	5.19	0.00
High-Emissions-Sectors	Hypothesis 1	0.33	11.27	0.00
	Hypothesis 2	0.34	11.76	0.00
	Hypothesis 3	0.31	8.59	0.00
	Hypothesis 4	0.28	9.59	0.00

Figure 4: H1 - Total GHG Residual Plots - Normality

Low-Emission-Sectors	High-Emission-Sectors
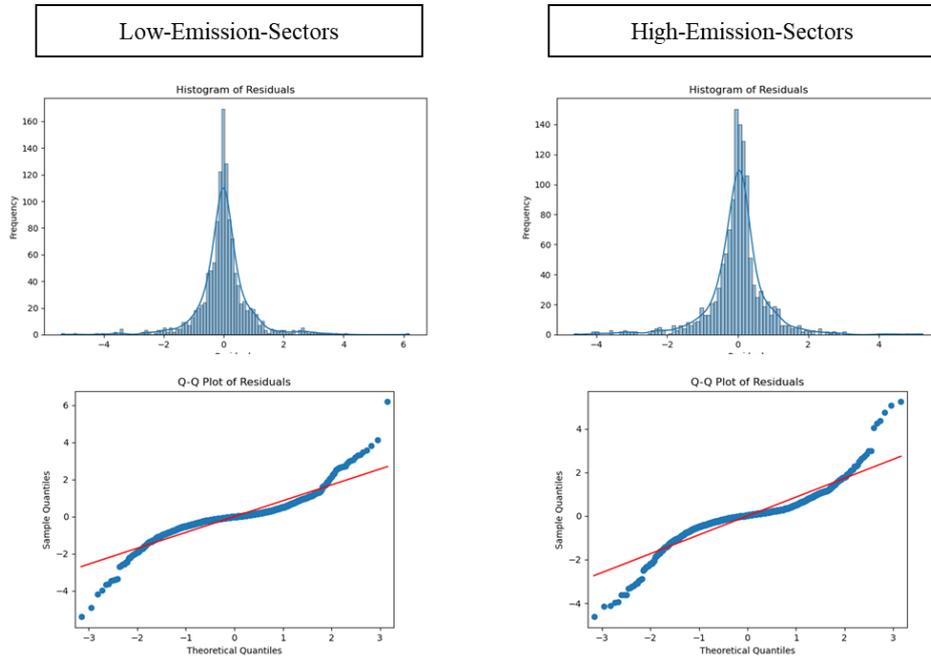
Figure 5: H2 - Scope 1 Residual Plots - Normality

Low-Emission-Sectors	High-Emission-Sectors
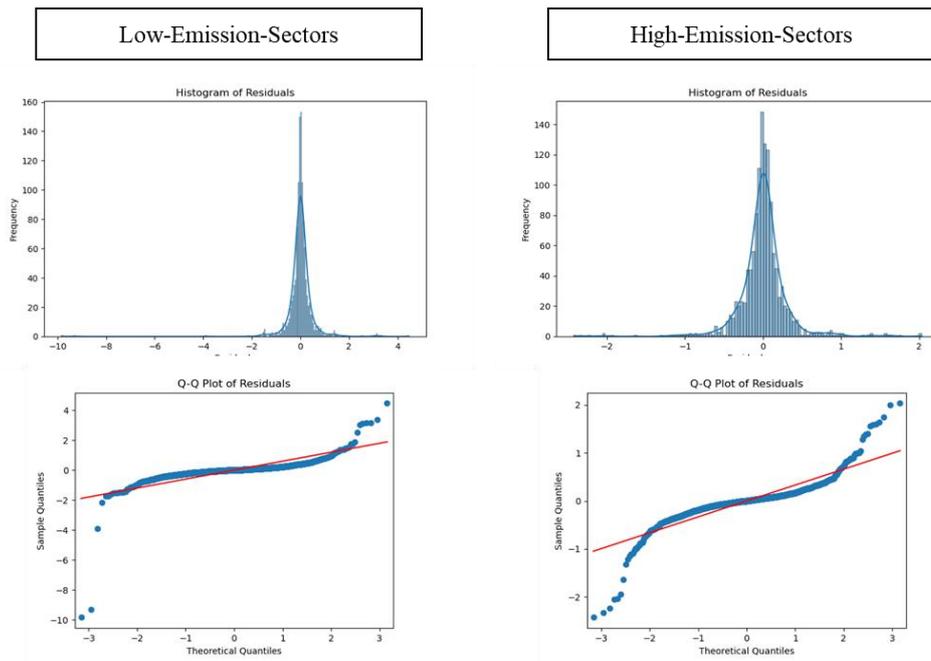
Figure 6: H3 - Scope 2 Residual Plots - Normality

Low-Emission-Sectors	High-Emission-Sectors
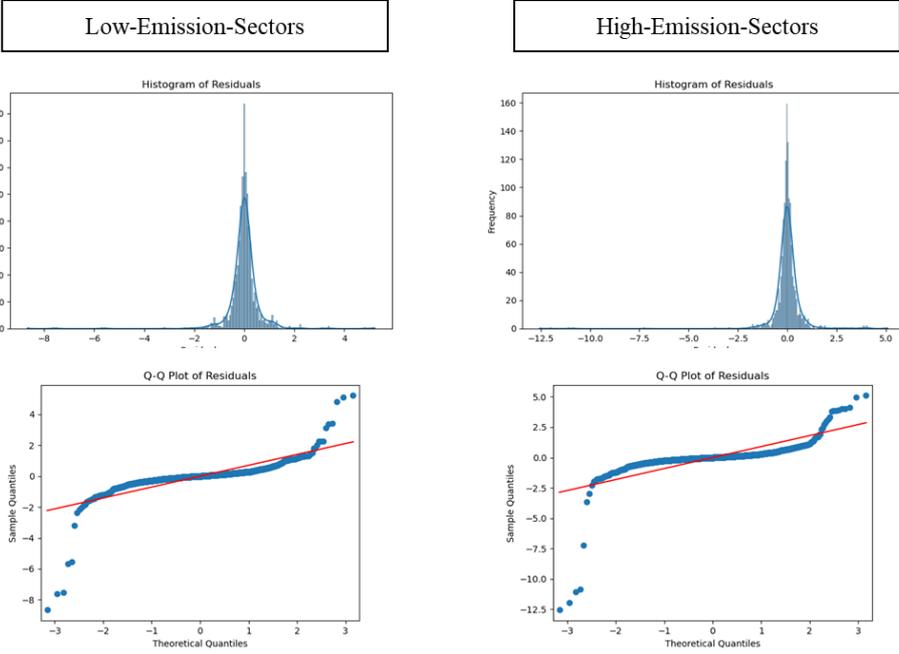
Figure 7: H4 - Scope 3 Residual Plots - Normality

Low-Emission-Sectors	High-Emission-Sectors
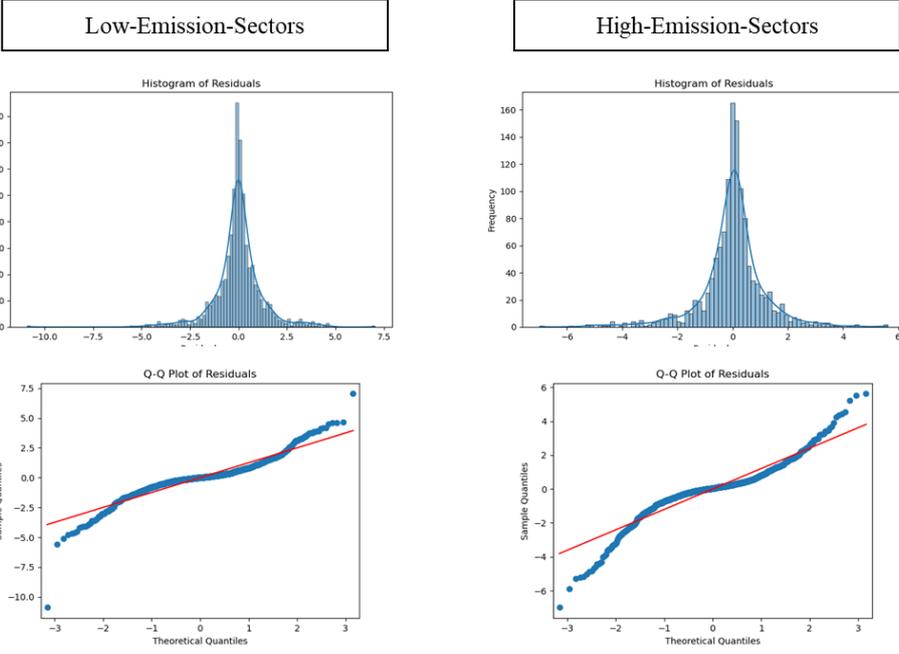
Appendix 4: Robustness Tests

Table 7: Robustness Test Regression Results - Link of Profitability to GHG Emissions

Main Regression

	Correlation with ROA	
Emission Types	**Low-Emission-Sectors**	**High-Emission-Sectors**
H1: Total GHG	Negative, not significant	Negative, significant
H2: Scope 1	Positive, not significant	Positive, not significant
H3: Scope 2	Positive, significant	Positive, not significant
H4: Scope 3	Negative, significant	Negative, significant

Relative GHG Emission Variables

	Correlation with ROA	
Emission Types	**Low-Emission Sectors**	**High-Emission Sectors**
H1: Total GHG	Negative, not significant	Negative, not significant
H2: Scope 1	Positive, not significant	Positive, not significant
H3: Scope 2	Positive, not significant	Negative, not significant
H4: Scope 3	Negative, not significant	Negative, not significant

ROE as Profitability Variable

	Correlation with ROE	
Emission Types	**Low-Emission Sectors**	**High-Emission Sectors**
H1: Total GHG	Negative, not significant	Negative, not significant
H2: Scope 1	Positive, significant	Positive, significant
H3: Scope 2	Positive, significant	Positive, not significant
H4: Scope 3	Negative, not significant	Negative, not significant

Robustness Check (SIZE) Total Assets

	Correlation with ROA	
Emission Types	**Low-Emission Sectors**	**High-Emission Sectors**
H1: Total GHG	Negative, not significant	Negative, not significant
H2: Scope 1	Positive, not significant	Positive, significant
H3: Scope 2	Positive, significant	Positive, significant
H4: Scope 3	Negative, not significant	Negative, not significant

ROS as Profitability Variable

	Correlation with ROS	
Emission Types	**Low-Emission Sectors**	**High-Emission Sectors**
H1: Total GHG	Negative, not significant	Negative, not significant
H2: Scope 1	Negative, not significant	Negative, not significant
H3: Scope 2	Positive, not significant	Negative, not significant
H4: Scope 3	Negative, not significant	Negative, not significant

COVID-19 (2020) Adjusted

	Correlation with ROA	
Emission Types	**Low-Emission Sectors**	**High-Emission Sectors**
H1: Total GHG	Negative, not significant	Negative, significant
H2: Scope 1	Positive, not significant	Positive, significant
H3: Scope 2	Positive, not significant	Positive, not significant
H4: Scope 3	Negative, significant	Negative, significant

Truncated Sample 1% - 99%

	Correlation with ROA	
Emission Types	**Low-Emission Sectors**	**High-Emission Sectors**
H1: Total GHG	Negative, not significant	Negative, significant
H2: Scope 1	Negative, not significant	Positive, significant
H3: Scope 2	Positive, not significant	Positive, significant
H4: Scope 3	Negative, not significant	Negative, significant

Full Data Sample (Low + High-Emission-Sectors)

	Correlation with ROA
Emission Types	**All Sectors**
H1: Total GHG	Negative, not significant
H2: Scope 1	Positive, not significant
H3: Scope 2	Positive, significant
H4: Scope 3	Negative, significant

Truncated Sample 5% - 95%

	Correlation with ROA	
Emission Types	**Low-Emission Sectors**	**High-Emission Sectors**
H1: Total GHG	Negative, significant	Negative, significant
H2: Scope 1	Negative, not significant	Positive, not significant
H3: Scope 2	Positive, not significant	Positive, not significant
H4: Scope 3	Negative, significant	Negative, significant