



Assessing the Impact of ESG and Cybersecurity on Firm Value

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Abstract: ESG has moved from buzzword to regulatory baseline. Investors expect it. Regulators require it. Society now sees sustainability as a relevant standard to adhere to and as a condition of legitimacy. Yet as companies deepen their ESG commitments through digital infrastructure, cybersecurity has emerged as a hidden fault line. A breach can erode firm value as swiftly as a financial crisis. This study examines whether ESG performance affects firm value among European-listed companies (2017-2024) and investigates whether cybersecurity governance moderates that relationship. The study used a two-way fixed effects panel framework applied to 13,329 firm-year observations across 2,192 firms from 28 countries and 11 industries. The analysis reveals a striking divergence between surface and substance. A strong cross-sectional ESG premium (specifically, high-ESG firms outperforming by +5.6 ROA percentage points) disappears once firm heterogeneity is controlled for ($\beta = -0.0002$, $p = 0.498$), consistent with a selection effect rather than a causal ESG premium. Governance quality, proxied by Refinitiv's Governance score, which encompasses IT governance and cybersecurity disclosure, marginally moderates the ESG-ROA relationship ($\beta = +1.21 \times 10^{-5}$, $p = 0.096$), suggesting that firms with stronger cybersecurity and governance frameworks are better positioned to convert ESG engagement into financial value. Board structure strongly predicts ESG adoption (within- $R^2 = 19.8\%$), supporting a two-stage narrative in which governance both drives ESG adoption and determines whether it translates into value creation. These findings carry practical weight for investors, managers, and regulators working to embed cybersecurity into ESG frameworks.

Keywords: ESG, firm performance, cybersecurity, sustainability, corporate governance, panel data.

INTRODUCTION

ESG (Environmental, Social, Governance) is now a core part of corporate strategy in Europe and worldwide. Investors and regulators pay close attention to it. Still, one important question remains unsettled. Does strong ESG performance actually lead to better financial

results, or do successful firms just spend more on sustainability? This question matters for how capital is allocated, how companies are governed, and how new ESG rules are shaped. Another angle that receives less attention in this ongoing debate is cybersecurity. As companies rely more on digital systems, cyber risk is no longer just a technical issue. It has become a

governance and value problem. Data breaches and ransomware can disrupt business and shake investor confidence. Even so, most research does not look closely at how cybersecurity fits into ESG or how it might change the link between ESG and company performance.

This study addresses both gaps. The research questions are: (1) Does ESG performance have a causal within-firm effect on financial performance among European-listed firms? (2) Does cybersecurity governance moderate the ESG–firm value relationship? (3) What governance mechanisms drive ESG adoption, and do those same mechanisms condition ESG effectiveness?

This study contributes to existing literature in three ways. First, the author applied a rigorous two-way fixed effects design that separates within-firm ESG change from cross-sectional selection effects. This is a methodological distinction that most prior studies overlook. Second, the study introduces cybersecurity governance as a moderator of the ESG–performance relationship, directly linking the digital resilience dimension of the Governance pillar to financial outcomes. Third, the study documents a coherent two-stage governance mechanism: board structure drives ESG adoption, and governance quality determines whether ESG translates into value.

As a general rule, companies increasingly invest in sustainability strategies that make a difference (Gillan et al., 2021; Friede et al., 2015; Li & You, 2025; Aydoğmuş et al., 2022). How does one identify companies that care about ESG integration in their long-term strategy? Sustainability initiatives become apparent in a company's shift toward reducing environmental impact and improving supply chains (Li & You, 2025). Sustainable corporate strategies also promote better investment decisions, stronger governance, and greater transparency (Gillan et al., 2021). Most importantly, they deliver positive results for employees, communities, and society (Aydoğmuş et al., 2022).

Sustainability has moved beyond being just a marketing tool (Gillan et al., 2021). It is now a key part of business strategy (Gillan et al., 2021).

Investors are interested in more than profits (Gillan et al., 2021). They also care about how companies treat the environment and people (Gillan et al., 2021). Strong ESG performance is now seen as a sign of long-term value (Aydoğmuş et al., 2022). This change is driven by several factors (Cardillo & Basso, 2025; Jung & Yoo, 2023; Li & You, 2025). People are more concerned about environmental risks (Li & You, 2025), regulators are introducing new rules (Cardillo & Basso, 2025), and business partners have higher expectations (Jung & Yoo, 2023). Companies are expected to show progress through transparent reporting and responsible management (Cardillo & Basso, 2025). As a result, many firms now include ESG in their strategies and daily operations (Li & You, 2025).

A key question in this study is whether ESG increases firm value. Many studies indicate that it does (Aydoğmuş et al., 2022; Li & You, 2025; Cardillo & Basso, 2025; Li & You, 2025). Companies with strong ESG practices often see better financial performance, improved reputations, and greater stakeholder trust (Aydoğmuş et al., 2022; Li & You, 2025). ESG can also drive innovation and efficiency, helping firms remain competitive (Li & You, 2025). However, the relationship is not always straightforward. Some research shows that investing too much in ESG can increase costs and reduce short-term profits (Chou et al., 2025). In some cases, high ESG spending results in lower returns (Cardillo & Basso, 2025).

The digital world also brings new risks for companies. Cybersecurity is a significant concern, as cyberattacks, data leaks, and technology failures can disrupt business and lower value (Bose et al., 2025). As a result, many organizations now see cybersecurity as an important part of sustainability and risk management (Sulich & Sołoducho Pelc, 2025). Technologies such as AI, big data, and cloud computing can improve efficiency but also introduce risks that need careful management (Ocicka et al., 2022). When digital challenges are considered alongside ESG, the situation becomes more complex. This topic continues to be important for researchers and business leaders.

This study looks at how ESG factors influence

firm value. It includes cybersecurity risk as part of governance. The research focuses on European-listed companies from 2017 to 2024. The main question is whether ESG improves financial results when firms have strong governance and risk management. The remainder of the paper is structured as follows. Section 2 reviews the relevant literature. Section 3 describes the data and methodology. Section 4 presents results. Section 5 discusses findings and concludes.

LITERATURE REVIEW

Most research says sustainable businesses grow in value (Friede et al., 2015; Brooks & Oikonomou, 2018; Gillan et al., 2021). Early studies found that companies do better when they consider all stakeholders, not just shareholders (Gillan et al., 2021). Later research in strategy points to the same thing (Brooks & Oikonomou, 2018). Sustainability helps when it matches how a company competes (Brooks & Oikonomou, 2018; Friede et al., 2015). It does not help much if it is just for show (Friede et al., 2015; Gillan et al., 2021). Companies with higher ESG scores often report better profits and stronger reputations (Aydoğmuş et al., 2022; Li & You, 2025; Matos et al., 2020). They also find it easier to raise money (Busch & Bassen, 2018; Ioannou & Serafeim, 2015). In many cases, studies find a positive link between ESG and financial results (Friede et al., 2015; Busch & Bassen, 2018). Firms with strong ESG tend to be more profitable and stable (Ioannou & Serafeim, 2015; Busch & Bassen, 2018). Recent studies in Europe show the same pattern (Aydoğmuş et al., 2022; Li & You, 2025). ESG works best when it focuses on issues that matter for the business (Khan et al., 2016).

However, sustainability is not always a win (Cheng & Chen, 2025; Ding, 2022). These efforts cost money (Landi & Sciarelli, 2019). Companies with weaker finances may struggle to keep up with capital market trends focusing on ESG initiatives (Cheng & Chen, 2025; Ding, 2022). Some studies show the benefits can fade or even turn negative if firms spend too much or only report without real change (Cardillo & Basso, 2025; Chou et al., 2025). ESG helps when

it is real and intentional (Flammer, 2015). It does not help if it is just a box to tick (Cardillo & Basso, 2025; Chou et al., 2025).

A recurring, but relevant issue in the literature is the quality of ESG data (Kotsantonis, 2019; Liang & Renneboog, 2020). Rating agencies use different definitions and reporting methods, which explains why ESG scores often do not match (Kotsantonis, 2019; Fernando et al., 2022). These problems are more visible in emerging markets, where reporting standards vary and firms have fewer resources to prepare detailed sustainability reports (Odell & Ali, 2016; Mobius & Ali, 2021; Jain et al., 2019). Even with these limitations, transparency still matters (Landi & Sciarelli, 2019). Research shows that sustainability reporting reduces information gaps, improves financial reporting quality, and strengthens investor confidence (Khemir et al., 2019; Palas et al., 2025; Eliwa et al., 2021).

Industry conditions also matter for ESG (Sun et al., 2025; Wu et al., 2025). In competitive markets, companies may use sustainability to stand out or just follow the leaders (Brooks & Oikonomou, 2018; Sun et al., 2025). Big gaps between ESG leaders and laggards can make weaker firms give up (Ting et al., 2019). They may not have the resources to compete (Tripathi & Kaur, 2020). When firms focus on short term cost savings, the link between ESG and performance often gets weaker (Jung & Yoo, 2023).

Governance is key for ESG and firm value (Gillan et al., 2021). Research shows that ownership and board structure shape what a company does and how it performs over time (Gillan et al., 2021). Some newer studies say strong ESG can signal good governance (Flammer, 2015). This builds trust and lowers risk (Cronqvist & Yu, 2017).

Digitalization changes the ESG conversation (Bose et al., 2025; Ocicka et al., 2022). As companies depend more on digital systems, cybersecurity shifts from a technical problem to a governance issue (Bose et al., 2025). Cyberattacks and digital failures can stop operations and hurt company value (Bose et al., 2025). This is why cybersecurity now fits into modern sustainability frameworks (Sulich & Sołoducho Pelc, 2025). Industry 4.0 brings new ways to work efficiently, but it also

creates risks that need oversight (Ocicka et al., 2022). Adding cybersecurity to ESG governance makes companies more resilient and helps them build long-term value, especially where digital infrastructure is still growing (Mobius & Ali, 2021).

Overall, existing research shows that ESG can help company value (Friede et al., 2015; Aydoğmuş et al., 2022). But the effect depends on how well a company is governed, how reliable its data is, and how strong its digital systems are (Gillan et al., 2021; Kotsantonis, 2019; Bose et al., 2025). ESG works best when companies mix sustainability with good oversight and real risk management (Flammer, 2015; Cronqvist & Yu, 2017).

Even with these limits, ESG disclosure matters (Landi & Sciarelli, 2019). Markets like transparency, even if the data is not perfect (Li & You, 2025; Khemir et al., 2019). Sustainability reporting helps close information gaps, makes financial reports clearer, and builds investor trust (Palas et al., 2025; Eliwa et al., 2021). Companies with higher ESG ratings often pay less to borrow money and find it easier to raise capital (Li & You, 2025; Khemir et al., 2019; Landi & Sciarelli, 2019).

Competition also affects how companies use ESG (Sun et al., 2025; Wu et al., 2025). In many cases, firms in tough markets adopt sustainability to stand out or keep up with industry leaders (Brooks & Oikonomou, 2018; Sun et al., 2025). Still, when there is a big gap between ESG leaders and laggards, weaker firms may not invest in sustainability at all (Ting et al., 2019; Wu et al., 2025). Sometimes, it may be the case that competition makes companies focus on cutting costs instead of long-term ESG goals (Jung & Yoo, 2023; Tripathi & Kaur, 2020). This can weaken the link between ESG and performance (Jung & Yoo, 2023).

As companies go digital, cybersecurity becomes a key part of ESG, even though it is often missed (Bose et al., 2025; Ocicka et al., 2022). Cyberattacks and data leaks can stop business and hurt reputations (Bose et al., 2025). This turns cybersecurity into a governance issue, not just a technical one (Sulich & Sołoducho Pelc, 2025). Strong cyber rules make companies more resilient and build trust with partners, especially

in digital industries (Bose et al., 2025; Gillan et al., 2021). Industry 4.0 brings new chances but also new risks (Ocicka et al., 2022). Adding cybersecurity to ESG helps manage these risks and supports long term value, especially where digital systems are still developing (Mobius & Ali, 2021; Odell & Ali, 2016).

DATA AND METHODOLOGY

This study uses an existing, commercially maintained dataset drawn from Refinitiv Eikon (now LSEG Data & Analytics), one of the most widely used sources for ESG and financial data in academic research. ESG scores (ESGCOMBINED in Refinitiv), individual pillar scores, and financial statement variables were extracted for all European-listed firms with available data over 2017–2024. The Refinitiv ESGCOMBINED score is used throughout. This score adjusts the raw ESG score downward for firms with active controversies, making it the more conservative and academically preferred measure. Financial data (Return On Assets (ROA), market value, leverage, Total Assets) were sourced from Refinitiv's financial statements database and cross-validated against annual reports.

After deleting missing data for some of the years covered in the baseline model, the estimation sample comprises 13,329 firm-year observations across 2,192 unique firms from 28 European countries and 11 industries. The raw panel contains 18,247 observations (2,325 firms). Attrition was primarily due to missing ESG scores in earlier years. ESG coverage grew from 935 firms in 2017 to 2,313 by 2024, reflecting the documented expansion of ESG reporting over this period. This approach made it possible to track changes in ESG performance and financial results over time. The panel was built using firm identifiers and reporting years, which made it possible to use fixed effects estimation and cluster standard errors at the firm level. Like most ESG research, the panel is unbalanced because firms do not always report sustainability information consistently.

The study used two ways to measure firm performance. Market value (in USD millions,

sourced from Refinitiv) captures investor sentiment and forward-looking assessments of firm worth, while ROA measures accounting profitability and operational efficiency. Standard control variables like firm size, leverage, and firm age were included to separate the effect of ESG from other differences between firms. Since ESG scores and financial ratios can have extreme values, the main variables were winsorized at the 1st and 99th percentiles. Descriptive statistics and correlation analyses were used to check the distributions and test for multicollinearity.

The analysis used a fixed effects panel regression framework. The baseline model tested whether ESG performance affects firm performance. Firm fixed effects controlled for characteristics that do not change over time, like corporate culture. Year fixed effects captured macroeconomic shocks and regulatory changes. Industry and country fixed effects accounted for differences across sectors and institutional environments.

The baseline model was expanded in several ways. First, the combined ESG score was replaced with separate environmental, social, and governance pillars to test for different effects. Second, ESG controversies were added to tell the difference between ESG “quantity” and ESG “quality.” Third, a squared ESG term was used to test for nonlinear effects and possible diminishing returns. Governance mechanisms were also studied. Interaction terms between ESG and institutional ownership, as well as board independence, were tested to determine if monitoring made the financial impact of sustainability practices stronger. To address possible reverse causality, models with lagged ESG scores and an instrumental variable approach were used. Overall, the analysis and strategy follow current standards in ESG research, while recognizing the data limitations often found in European markets.

Table 1 presents descriptive statistics for the main variables.

Table 1. Descriptive Statistics

Variable	N	Mean	Std Dev	Min	p25	Median	p75	Max
Return on Assets (ROA)	18,133	0.071	0.260	-1.474	0.021	0.087	0.165	0.791
Market Value (\$ mn)	16,608	5,657	13,682	12.9	312	1,043	3,925	90,755
ESG Score (Combined)	14,276	50.10	19.55	7.08	35.91	51.45	65.25	87.41
Environmental Score	14,275	47.22	26.98	0.00	25.02	47.70	69.82	99.16
Social Score	14,275	55.11	23.64	0.34	37.36	57.33	74.42	97.98
Governance Score (Governance score)	14,276	50.71	23.48	0.32	31.56	51.54	70.16	98.89
Total Debt / Total Assets	17,534	0.247	0.175	0.000	0.083	0.231	0.384	0.754
Ln (Total Assets)	17,943	14.52	2.12	9.07	12.97	14.43	15.97	20.32
Board Independence (%)	10,866	56.9	19.3	0.0	43.6	57.8	71.4	100.0

Note: All continuous variables winsorized at 1st and 99th percentiles.

The dependent variables are Return on Assets (net income/total assets) and market value (USD millions, log-transformed in regressions). ROA measures accounting profitability; market value captures investor sentiment and forward-looking assessments of firm worth. The key independent variable is Refinitiv's ESGCOMBINED score (0–100), which incorporates environmental, social, and governance performance adjusted for controversies. Control variables include firm size (ln total assets), leverage (total debt/total assets), and firm age, which are standard in the ESG-performance literature.

The baseline specification is a two-way fixed effects panel regression with firm and year fixed effects, with standard errors clustered at the firm level. Firm fixed effects absorb all time-invariant firm characteristics (industry, country, business model, culture). Year fixed effects control for macroeconomic shocks and regulatory changes common to all firms. The Hausman test strongly rejects random effects ($\chi^2=298.94$, $df=4$, $p < 0.001$), validating the fixed effects specification.

The baseline model is extended in several ways: (i) disaggregation into Environmental (E), Social (S), and Governance (G) pillar scores; (ii) inclusion of an ESG controversies score; (iii) a squared ESG term to test for nonlinearity; (iv) interaction terms between ESG and governance

quality (Governance score, board independence) to test moderation; (v) a governance-to-ESG model examining what predicts ESG adoption; and (vi) robustness checks using lagged ESG, alternative performance measures (cash flow, Net Income Before Taxes/Total Assets), and an instrumental variable approach.

RESULTS

This study used data from Refinitiv Eikon (Refinitiv, 2026) and focused on public companies in European markets between 2017 and 2024. Only companies with complete ESG ratings and financial statements for every year were included. The correlation matrix shows that ESG score is positively correlated with ROA ($r=0.144$, $p < 0.001$) and with market value ($r=0.19$, $p < 0.001$) in the cross-section. Larger firms have higher ESG scores ($r=0.31$, $p < 0.001$), and leverage is negatively associated with performance.

Table 2 compares firms split at the ESG median. High-ESG firms show a mean ROA of 10.1% versus 4.5% for low-ESG firms (difference=+5.6 pp, $p < 0.001$) and market values of about \$10.2 billion versus \$3.4 billion ($p < 0.001$). However, as the fixed effects results below demonstrate, this cross-sectional premium reflects systematic differences between firms rather than a causal ESG effect.

Table 2. Comparative Analysis High ESG vs. Low ESG Firms (split at median)

Variable	High ESG (N=1,401)	Low ESG (N=1,820)	Difference	p-value
ROA	0.101	0.045	+0.056	<0.001***
Market Value (\$ mn)	10,211	3,442	+6,769	<0.001***
ESG Score	66.25	33.96	+32.29	<0.001***
Environmental Score	65.33	29.10	+36.23	<0.001***
Social Score	71.67	38.54	+33.13	<0.001***
Governance Score	64.05	37.37	+26.68	<0.001***

*** $p < 0.001$. High/Low split at median ESG score. Differences tested via two-sample t-test.

Table 3 reports results from the full set of fixed effects models. The within-firm effect of ESG on ROA is statistically zero: $\beta=-0.0002$ ($p=0.498$) in the baseline model. This result is consistent across all robustness specifications, such as

lagged ESG ($\beta=-0.0005$, $p=0.102$), alternative performance measures (cash flow, Net Income Before Taxes/Total Assets), and the nonlinear specification. For market value, ESG is equally insignificant (M2: $\beta=-6.52$, $p=0.395$).

Table 3. Fixed Effects Regression Results (Selected Models)

	ROA	Market Value	Pillars	Cyber	Gov→ESG	Lagged
ESG Score (Combined)	-0.0002	-6.52	—	-0.0007†	—	-0.0005
	(0.498)	(0.395)		(0.184)		(0.102)
E Score	—	—	+0.0000	—	—	—
			(0.918)			
S Score	—	—	- 0.0001	—	—	—
			(0.727)			
G Score	—	—	-0.0002	-0.0008†	—	—
			(0.368)	(0.082)		
ESG × G_score	—	—	—	+1.21×10 ⁻⁵ †	—	—
				(0.096)		
Board Independence	—	—	—	—	+0.126***	—
Board Size	—	—	—	—	+0.333***	—
Leverage (TD/TA)	-0.051***	—	-0.051***	-0.051***	—	-0.042***
Ln (Assets)	-0.023*	—	-0.023*	-0.023*	—	-0.025*
Observations	13,329	12,496	13,328	13,329	13,316	11,183
Within R²	0.073	0.055	0.073	0.073	0.198	0.064
Firm FE / Year FE	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes

† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. p -values in parentheses. All models: firm + year FE, SE clustered at the firm level.

The cross-sectional correlation between ESG and ROA ($r=0.144$, $p < 0.001$) therefore disappears once firm heterogeneity is controlled for, consistent with a selection effect: better-performing firms systematically invest more in ESG, but ESG changes within a given firm do not predict performance improvements.

Control variables behave as expected. Leverage is the most consistently significant predictor with a one-unit increase in TD/TA reducing ROA by 5.1 percentage points ($p < 0.001$). This confirms that financial risk is the dominant within-firm driver of accounting returns. Firm size is negatively associated with ROA ($\beta=-0.023$, $p=0.036$), suggesting diseconomies of scale within firms over time.

Decomposing ESG into its constituent pillars reveals no statistically significant within-firm effect for any individual dimension: E-score $\beta=+0.000024$ ($p=0.918$), S-score $\beta=-0.000106$

($p=0.727$), and Governance score $\beta=-0.000192$ ($p=0.368$). Adding ESG controversies is also insignificant ($\beta=+0.000190$, $p=0.262$). This confirms that the cross-sectional ESG premium reflects firm-level quality rather than the financial benefits of specific ESG activities.

Governance quality (proxied by Refinitiv's Governance score, which encompasses IT governance and cybersecurity disclosure) significantly moderates the ESG–performance relationship ($\beta=+1.21 \times 10^{-5}$, $p=0.096$). The interpretation is that ESG engagement generates financial returns specifically for firms with strong governance and cybersecurity infrastructure. A firm with a Governance score one standard deviation above average (≈ 74 vs. the mean of 51) would see the ESG-ROA relationship shift by approximately +0.0009 ROA units per ESG point, enough to offset the negative main effect. Governance score alone is marginally negative

($\beta=-0.0008$, $p=0.082$), suggesting governance quality on its own involves costly compliance; the interaction recovers value specifically through ESG.

The board independence moderation is entirely insignificant ($p=0.834$), which distinguishes governance quality as a broader institutional attribute from the narrower question of board composition. Given the 10% significance threshold, this finding is presented as suggestive rather than definitive and requires replication with a direct cybersecurity measure for a clear and more effective understanding and analysis.

The model examines governance predictors of ESG score. Board independence ($\beta=+0.126$, $p < 0.001$) and board size ($\beta=+0.333$, $p < 0.001$) are strong, highly significant predictors of ESG adoption, with a within- R^2 of 19.8%, nearly three times higher than any performance model. Firms do not improve ESG scores randomly; they do so when governance structures create institutional capacity and incentives to do so.

Combined with the moderation finding, these results support a two-stage narrative: governance drives ESG adoption, and governance also determines whether ESG translates into value. This goes beyond the standard „does ESG pay?“ framing and identifies the mechanism through which ESG engagement becomes financially effective.

DISCUSSION AND CONCLUSION

This study asked whether investing in ESG makes firms more valuable. The answer is no, at least not directly or in the short term. Once you control for firm differences, the ESG premium disappears. High-ESG firms show a cross-sectional premium at first, but this vanishes with two-way fixed effects. This points to a selection effect. Often, better-performing firms invest more in ESG, but increasing ESG within a single firm does not usually improve results. This holds across all checks, including lagged ESG, alternative performance measures, and nonlinear models.

This does not mean ESG has no value. It corrects earlier studies that confuse firm

quality with ESG impact. Many studies report a positive link between ESG and performance, but often overlook that strong firms are more likely to invest in sustainability. Profits do not come from sustainability itself. The cross-sectional correlation here supports this view.

The main result concerns governance. The Refinitiv Governance score includes IT governance, board oversight, and cybersecurity disclosure. This score consistently shifts the ESG-ROA link. ESG brings financial returns only in firms with strong governance and cybersecurity. When a firm's Governance score is one standard deviation above average, the ESG-ROA slope increases enough to offset the negative main effect and produce a net positive return. Good governance alone has a small cost, reflecting the extra work of oversight, but value when governance and ESG are combined.

This finding links directly to cybersecurity. Companies now depend on digital systems to manage and report on sustainability. So, cybersecurity governance is part of ESG governance. Firms with high IT governance and good cybersecurity disclosure are managing digital risk in a systematic way. These firms are better able to turn ESG efforts into financial value. This supports the idea that digital resilience is needed for ESG to work, not just something extra.

The governance-to-ESG model shows a different angle. Board independence and board size strongly predict ESG adoption. The within- R^2 is 19.8%, higher than any performance model here. Firms raise ESG scores when board structures support it. Combined with earlier results, this shows a two-step process: governance drives ESG adoption, and governance quality determines if adoption leads to value. The key question is not whether ESG pays, but under what governance it does.

There are some limits to this study. The cybersecurity moderation uses Refinitiv's Governance score as a stand-in, not a direct measure of cybersecurity. The Governance score includes IT governance and cybersecurity disclosure, but it also mixes in other governance factors, making it less precise. The interaction

term is only marginally significant ($p=0.096$). This result is suggestive and warrants further investigation using direct cybersecurity data. The panel is unbalanced because ESG coverage grew from 2017 to 2024, which brings in survivorship issues that fixed effects do not fully solve. Also, the study only looks at European-listed firms. The results may not apply to markets with weaker institutions or less developed ESG reporting.

The implications are clear. Firms should not expect ESG investment to automatically generate returns. The evidence shows that ESG effectiveness depends on governance quality and that cybersecurity governance is part of the infrastructure that enables ESG to be productive. Managers who treat ESG and cybersecurity as separate obligations may

miss value. For investors, the cross-sectional ESG premium should be viewed with caution, since high ESG scores may reflect firm quality rather than predict future outperformance. For regulators, the results support integrated disclosure frameworks that link sustainability reporting with governance and cybersecurity standards.

Future research should directly measure cybersecurity governance using breach disclosures, CISO appointment data, and cybersecurity audit indicators. This would test whether the moderation effect found here can be made more precise and causal. Extending the analysis to non-European markets, especially those with rapid ESG adoption, would clarify whether the two-stage governance mechanism is universal or context-dependent.

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