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Analysis of ESG scores on Malaysian banking performance: a panel data approach

Naufal Shadiq[1*]

[1]Faculty of Economics and Business Universitas Negeri Jakarta, Indonesia

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Abstract

This study study examines the relationship between environmental, social, and governance (ESG) scores and bank performance in Malaysia over 2019–2024. We focus on profitability, measured by return on assets adjusted for risk-weighted assets (ROA RWA), and firm value, proxied by Tobin's Q. Using a fixed effects framework as the primary specification, complemented by nonlinear and interaction models, we find no statistically significant linear or lagged effect of ESG on profitability or firm value. However, we document a nonlinear (inverted U-shaped) relationship between ESG and firm value, indicating diminishing returns at higher ESG levels. Furthermore, the interaction between ESG and firm size is negative and significant, suggesting that ESG has stronger valuation effects for smaller banks. These findings imply that ESG is not a universally value-enhancing factor but operates through nonlinear and conditional mechanisms. The study contributes to the ESG–banking literature by reconciling mixed prior evidence and highlighting the importance of model specification and firm heterogeneity.

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*Corresponding author:
shadiqnaufal027@gmail.com

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1. Introduction

The increasing emphasis on environmental, social, and governance (ESG) practices has reshaped expectations toward financial institutions, particularly banks. As highly regulated entities that rely heavily on public trust, banks are no longer evaluated solely based on financial performance, but also on their sustainability, governance quality, and social responsibility (Friede et al., 2015). This shift reflects the growing recognition that long-term financial stability is closely linked to responsible and transparent business practices. Consequently, ESG has emerged as a strategic framework that not only enhances firm value and stakeholder trust but also supports risk management and institutional resilience. In particular, the governance and risk management components embedded within ESG play a critical role in strengthening financial stability in the banking sector (Menicucci & Paolucci, 2023).

From a theoretical perspective, the resource-based view (RBV) and dynamic capabilities frameworks conceptualize ESG as a strategic intangible asset that enhances reputational capital, strengthens stakeholder trust, and reduces information asymmetry (Azmi et al., 2021; Wernerfelt, 1984). Dynamic capabilities theory further suggests that ESG reflects a firm's adaptive capacity to respond to regulatory, environmental, and societal pressures, potentially transforming sustainability initiatives into long-term value creation (Aydoğmuş et al., 2022; Teece et al., 1997).

However, despite strong theoretical foundations, empirical evidence on the ESG–financial performance nexus remains inconclusive, particularly in emerging markets. While some studies report positive associations between ESG and financial performance, others find weak, insignificant, or even negative relationships (Buallay, 2019; McWilliams & Siegel, 2000). These mixed findings suggest that the ESG–performance relationship may not be strictly linear and may depend on firm-specific characteristics as well as the level of ESG engagement.

In addition, measurement and identification challenges remain important concerns in this literature. ESG performance and financial outcomes may be jointly determined, as financially stronger banks possess greater capacity to invest in sustainability initiatives (Azmi et al., 2021; Wintoki et al., 2012). Furthermore, the choice of performance measures is critical. Conventional return on assets (ROA) does not fully capture risk exposure in banking, whereas return on assets based on risk-weighted assets (ROA RWA) provides a more appropriate risk-adjusted measure of profitability. Meanwhile, Tobin's Q reflects forward-looking market valuation (Aydoğmuş et al., 2022; Nizam et al., 2019).

Against this backdrop, Malaysia provides a relevant empirical setting. As part of ASEAN's evolving financial landscape, Malaysian banks face increasing regulatory pressure for sustainability disclosure, while the depth and effectiveness of ESG implementation remain heterogeneous (Mohammad & Wasiuzzaman, 2021). This institutional context allows for an examination of whether ESG functions as a genuine value-creating mechanism or primarily reflects compliance and existing firm characteristics.

Accordingly, this study investigates the relationship between ESG performance and bank performance in Malaysia over the period 2019–2024. Unlike prior studies that primarily focus on linear relationships, this study extends the analysis by incorporating nonlinear and conditional effects to capture potential diminishing returns and firm-level heterogeneity. By focusing on risk-adjusted profitability (ROA RWA) and firm value (Tobin's Q), this study contributes to the literature by providing evidence that ESG effects are not uniform, but depend on both the level of ESG engagement and firm characteristics.

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2. Conceptual framework

2.1. ESG as a strategic resource

Environmental, social, and governance (ESG) performance reflects a firm's commitment to sustainable and responsible business practices beyond traditional financial metrics. In recent years, ESG has gained increasing importance as a framework for evaluating corporate performance, particularly in relation to long-term value creation and risk management (Friede et al., 2015). In the banking sector, ESG integration is especially relevant due to high regulatory scrutiny, systemic risk exposure, and strong reliance on stakeholder trust.

From the resource-based view (RBV), firms are conceptualized as bundles of heterogeneous resources that generate competitive advantage when they are valuable, rare, and difficult to imitate (Barney, 1991; Wernerfelt, 1984). ESG practices—such as governance transparency, risk management systems, and stakeholder engagement—can be interpreted as intangible strategic resources embedded within organizational processes (Azmi et al., 2021). These resources enhance reputational capital, reduce information asymmetry, and may improve access to financing.

However, the RBV perspective alone may not fully explain firm behavior in dynamic financial environments. The dynamic capabilities framework extends this view by emphasizing a firm's ability to adapt to evolving regulatory, environmental, and societal pressures (Teece et al., 1997). Accordingly, ESG can be interpreted not only as a strategic resource but also as an adaptive capability that supports risk management, strengthens institutional resilience, and aligns long-term strategic objectives (Menicucci & Paolucci, 2023; Nizam et al., 2019). Thus, ESG can be conceptualized as a strategic capability that influences firm outcomes through both internal efficiency and external market perception.

2.2. ESG and banking financial performance

The relationship between ESG and financial performance in banking operates through two key channels: risk-adjusted profitability and market valuation. First, profitability in banking must be evaluated relative to risk exposure. Traditional return on assets (ROA) does not fully capture differences in asset risk. Therefore, return on assets based on risk-weighted assets (ROA RWA) provides a more appropriate measure of managerial efficiency within regulatory capital frameworks (Menicucci & Paolucci, 2023; Nizam et al., 2019). ESG practices may enhance internal controls, improve risk monitoring, and strengthen credit quality, which in turn may influence risk-adjusted profitability.

Second, firm value is better reflected through forward-looking market measures such as Tobin's Q (Aydoğmuş et al., 2022). ESG performance may serve as an indicator of long-term stability and governance quality, thereby reducing information asymmetry and influencing investor expectations. As a result, ESG may affect market valuation differently from accounting-based profitability.

2.3. Nonlinear and conditional effects of ESG performance

Despite strong theoretical arguments, empirical evidence on the ESG–performance relationship remains mixed (Buallay, 2019; McWilliams & Siegel, 2000). This inconsistency suggests that the ESG–performance relationship may not be strictly linear and may vary depending on firm characteristics and the level of ESG engagement.

From an economic perspective, ESG investments may exhibit diminishing marginal returns. Initial ESG adoption improves governance quality, transparency, and stakeholder trust, thereby enhancing firm value. However, as ESG engagement increases, additional investments may generate lower incremental benefits while incurring higher compliance costs and managerial complexity (Azmi et al., 2021). This trade-off is consistent with prior findings that suggest a nonlinear relationship between sustainability practices and financial performance,

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where the benefits of ESG may decline beyond a certain threshold (Nollet et al., 2016). While ESG contributes to improvements in organizational processes and long-term orientation (Eccles et al., 2014), its marginal impact on firm value may weaken at higher levels of engagement. This implies a nonlinear (inverted U-shaped) relationship, where ESG contributes positively up to an optimal level, beyond which its marginal effect declines.

In addition, ESG performance may function as a signaling mechanism in financial markets characterized- by information asymmetry. According to signaling theory, firms use observable indicators to convey private information about their underlying quality to external stakeholders (Connelly et al., 2011; Spence, 1973). In this context, ESG disclosures may signal governance quality, risk management capability, and long-term strategic orientation. This signaling effect is likely to be stronger for smaller banks, where information asymmetry is higher and credibility needs to be established. In contrast, for larger banks, ESG practices may be perceived as standard expectations, thereby reducing their incremental signaling value. Taken together, these arguments suggest that ESG effects are both nonlinear and conditional, rather than uniformly positive.

2.4. Literature review and research gap

The relationship between environmental, social, and governance (ESG) performance and corporate financial performance remains inconclusive, with studies reporting positive, negative, and insignificant results across sectors, including banking (Aydoğmuş et al., 2022; Nollet et al., 2016). While bank's ESG practices may enhance stakeholder trust and access to finance (Nizam et al., 2019), their implementation costs can initially outweigh benefits, particularly in the banking sector (Menicucci & Paolucci, 2023).

To explain these mixed findings, prior research suggests a nonlinear relationship. While some studies argue for a U-shape (Barnett & Salomon, 2012), in the heavily regulated banking sector where compliance costs are steep, ESG investments are more likely to exhibit diminishing returns, forming an inverted U-shape where excessive ESG engagement eventually penalizes market valuation.

From a theoretical perspective, signaling theory explains how ESG disclosures reduce information asymmetry by signaling firm quality and risk management capability to stakeholders (Connelly et al., 2011; Spence, 1973). This mechanism is particularly relevant in banking, where transparency and trust are critical (Menicucci & Paolucci, 2023). However, ESG effects are not uniform, as aggregated scores may obscure differences across environmental, social, and governance dimensions, which can produce heterogeneous financial impacts (Aydoğmuş et al., 2022).

In emerging markets such as Malaysia, ESG adoption remains uneven despite increasing regulatory pressure, and its impact on firm value has been shown to depend on firm-specific conditions (Mohammad & Wasiuzzaman, 2021). However, prior Malaysian banking studies have predominantly relied on linear models without adequately controlling for unobserved firm heterogeneity via fixed effects, leaving a significant methodological gap. Accordingly, this study addresses this gap by examining the nonlinear and conditional effects of ESG on risk-adjusted profitability (ROA RWA) and firm value (Tobin's Q) in the Malaysian banking sector.

3. Research methods

3.1. Research design and objective

The primary objective of this study is to examine the relationship between environmental, social, and governance (ESG) performance and the financial performance of Malaysian commercial banks. ESG performance is primarily measured using ESG combined score (ESGC), which captures overall sustainability performance across environmental, social, and governance dimensions. Specifically, the study investigates whether ESG performance

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influences (i) risk-adjusted profitability measured by return on assets based on risk-weighted assets (ROA RWA) and (ii) market valuation measured by Tobin's Q.

In addition to examining the direct relationship, this study further explores whether the ESG–performance relationship is nonlinear and varies across firm characteristics. This approach is motivated by prior literature suggesting that ESG effects may not be uniform and may depend on the level of ESG engagement as well as firm-specific conditions.

This research adopts a quantitative approach using secondary panel data. The population consists of financial institutions listed on Bursa Malaysia. However, the accessible population is restricted to commercial banks with consistent and publicly available ESG and financial data during the 2019–2024 period. A purposive sampling technique is applied based on the following criteria: (1) listed on Bursa Malaysia, (2) classified under the banking sector, (3) availability of ESG scores from Refinitiv, and (4) availability of audited annual financial statements. Based on these criteria, eight Malaysian commercial banks meet the selection requirements.

The final dataset forms an unbalanced panel covering the period 2019–2024, with the number of observations varying across models due to ESG data availability. ESG data, including the combined score and individual pillar scores (environmental, social, and governance), are obtained from the Refinitiv ESG database. Financial data are collected from banks' audited annual reports and financial statements, while macroeconomic variables—such as GDP growth and inflation rate—are sourced from Bank Negara Malaysia and the World Bank database.

To ensure robustness and mitigate the influence of extreme values, all continuous variables are winsorized at the 1st and 99th percentiles. The operational definitions and measurement formulas of all variables are presented in Table 1.

Tabel 1. Research variables

Variable	Definition	Measurement
Dependent variable		
ROA RWA	Measures the bank's ability to generate profit from risk-weighted assets.	$\text{ROA RWA} = \frac{\text{Net income}}{\text{Risk} - \text{weighted assets}}$
Tobin's Q	Captures market valuation relative to book value of assets.	$\text{Tobin}'\text{s Q} = \frac{\text{MV equity} + \text{BV of debts}}{\text{BV of assets}}$
Independent variable		
ESG combined score	Overall sustainability performance based on environmental, social, and governance dimensions.	ESG score (0–100)
Control variable		
Firm size	Reflects bank scale and operational capacity.	$\text{Firm size} = \ln(\text{Total assets})$
Firm leverage	Indicates reliance on external debt financing.	$\text{Firm leverage} = \frac{\text{Totaldebt}}{\text{Total assets}}$
Loan-to-deposit ratio (LDR)	Measures liquidity and lending intensity.	$\text{LDR} = \frac{\text{Total loans}}{\text{Total deposits}}$
Capital adequacy ratio (CAR)	Reflects capital strength relative to risk exposure.	$\text{CAR} = \frac{\text{Tier 1 capital + Tier 2 capital}}{\text{Risk-weighted assets}}$
GDP growth	Captures macroeconomic expansion effects.	$\text{GDP growth} = \frac{\text{GDP}_t - \text{GDP}_{t-1}}{\text{GDP}_{t-1}}$
Inflation rate	Represents changes in general price levels affecting banking performance.	$\text{Inflation rate} = \frac{\text{IHK}_t - \text{IHK}_{t-1}}{\text{IHK}_{t-1}}$

3.2. Research hypotheses

Drawing upon the resource-based view (RBV), dynamic capabilities framework, and

signaling theory, ESG performance is conceptualized as a strategic capability that may influence banking financial performance through improved risk management, reputational capital, and information signaling mechanisms. However, prior literature suggests that the ESG–performance relationship may not be strictly linear and may vary across firm characteristics. Accordingly, this study formulates the following hypotheses:

H1: There is a significant association between ESG performance and banking financial performance (risk-adjusted profitability and market valuation).

H2: The relationship between ESG performance and market valuation is nonlinear, exhibiting an inverted U-shaped pattern.

H3: The impact of ESG performance on market valuation is conditional upon firm size, with smaller banks experiencing stronger positive effects.

3.3. Empirical models

To examine the relationship between ESG performance and banking financial performance, this study employs panel data regression models. The primary specification is estimated using fixed effects (FE) model with robust standard errors, which controls for unobserved time-invariant heterogeneity across banks. The baseline models for risk-adjusted profitability (ROA RWA) and market valuation (Tobin's Q) are specified as follows:

$$\mathrm{ROA\_RWA}_{it} = \beta_0 + \beta_1\,\mathrm{ESGC}_{it} + \sum\beta_k\,\mathrm{Controls}_{it} + \alpha_i + \gamma_t + \varepsilon_{it}$$

$$\mathrm{TQ}_{it} = \beta_0 + \beta_1\,\mathrm{ESGC}_{it} + \sum\beta_k\,\mathrm{Controls}_{it} + \alpha_i + \gamma_t + \varepsilon_{it}$$

where $\alpha_i$represents unobserved bank-specific effects, $\gamma_t$captures year fixed effects to account for macroeconomic shocks, and $\varepsilon_{it}$is the error term. To capture potential nonlinear effects of ESG, a quadratic term (ESGC^2) is introduced into the baseline specification. This allows for testing whether ESG investments exhibit diminishing or nonlinear marginal returns:

$$\mathrm{ROA\_RWA}_{it} = \beta_0 + \beta_1\,\mathrm{ESGC}_{it} + \beta_2\,\mathrm{ESGC}_{it}^2 + \sum\beta_k\,\mathrm{Controls}_{it} + \alpha_i + \gamma_t + \varepsilon_{it}$$

$$\mathrm{TQ}_{it} = \beta_0 + \beta_1\,\mathrm{ESGC}_{it} + \beta_2\,\mathrm{ESGC}_{it}^2 + \sum\beta_k\,\mathrm{Controls}_{it} + \alpha_i + \gamma_t + \varepsilon_{it}$$

Furthermore, to examine whether the ESG–performance relationship varies across firm characteristics, an interaction term between the ESG score and firm size is included:

$$\mathrm{ROA\_RWA}_{it} = \beta_0 + \beta_1\,\mathrm{ESGC}_{it} + \beta_2\,\mathrm{SIZE}_{it} + \beta_3\,(\mathrm{ESGC}_{it} \times \mathrm{SIZE}_{it}) + \sum\beta_k\,\mathrm{Controls}_{it} + \alpha_i + \gamma_t + \varepsilon_{it}$$

$$\mathrm{TQ}_{it} = \beta_0 + \beta_1\,\mathrm{ESGC}_{it} + \beta_2\,\mathrm{SIZE}_{it} + \beta_3\,(\mathrm{ESGC}_{it} \times \mathrm{SIZE}_{it}) + \sum\beta_k\,\mathrm{Controls}_{it} + \alpha_i + \gamma_t + \varepsilon_{it}$$

To address potential endogeneity concerns, a two-stage least squares (2SLS) approach is applied as a robustness check. The first-stage regression predicts the ESG score using instrumental variables:

$$\mathrm{ESGC}_{it} = \delta_0 + \delta_1\,\mathrm{LagESGC}_{it} + \delta_2\,\mathrm{PeerESGC}_{it} + \sum\delta_k\,\mathrm{Controls}_{it} + \mu_i + \gamma_t + \nu_{it}$$

where LagESGC represents the one-year lagged ESG score, and PeerESGCrepresents the leave-one-out industry mean ESG score. In the second stage, the predicted ESG values ($\widehat{\mathrm{ESGC}}_{it}$) are substituted back into the main performance equations:

$$\mathrm{ROA\_RWA}_{it} = \beta_0 + \beta_1\,\widehat{\mathrm{ESGC}}_{it} + \sum\beta_k\,\mathrm{Controls}_{it} + \alpha_i + \gamma_t + \varepsilon_{it}$$

$$\mathrm{TQ}_{it} = \beta_0 + \beta_1\,\widehat{\mathrm{ESGC}}_{it} + \sum\beta_k\,\mathrm{Controls}_{it} + \alpha_i + \gamma_t + \varepsilon_{it}$$

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For the 2SLS robustness check, instrument strength and validity were confirmed using the Kleibergen–Paap Wald F-statistic for instrument relevance and the Sargan–Hansen J-test for overidentification exogeneity. This study is based on a relatively small panel of eight Malaysian commercial banks observed over a six-year period (2019–2024). Consequently, the empirical models may be subject to limited statistical power and potential overfitting, particularly in specifications involving multiple control variables and instrumental variables. As a result, the findings should be interpreted with caution and viewed as indicative rather than definitive.

4. Findings

4.1. Descriptive statistics

Table 2 presents the descriptive statistics of the main variables. The average ESG combined score (ESGC) is 67.86, indicating a moderate level of sustainability performance among Malaysian banks. Risk-adjusted profitability (ROA RWA) has a mean of 0.0149, while Tobin's Q averages 0.868, suggesting relatively stable market valuation across the sample. The dispersion of ESGC is moderate, while Tobin's Q shows relatively low variation, reflecting a relatively homogeneous banking environment.

Table 2. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ESGC	43	67.857	16.364	29.85	86.58
ROA RWA	46	0.0149	0.0090	-0.0327	0.0235
TQ	46	0.8679	0.0721	0.7703	1.0141
SIZE	46	26.301	0.904	24.83	27.70
FLEV	46	0.7706	0.0484	0.685	0.8396
CAR	46	0.1845	0.0189	0.1448	0.2331
LDR	46	0.8635	0.0381	0.7938	0.9412
INF	46	0.0158	0.0153	-0.012	0.033

4.2. Pre-estimation diagnostic

Table 3 reports the Pearson correlation matrix. ESGC is positively correlated with ROA RWA ($r = 0.389$, $p < 0.01$) but shows no significant linear correlation with Tobin's Q. Notably, ESGC is strongly correlated with firm size ($r = 0.860$, $p < 0.01$), suggesting that larger banks tend to exhibit higher ESG performance. To ensure this high bivariate correlation does not compromise the regression models, a formal multicollinearity diagnostic was required.

The initial set of control variables included GDP growth (GDPG) as a proxy for macroeconomic conditions. However, during the preliminary diagnostic phase, GDPG was found to exhibit a high bivariate correlation with inflation (INF). To ensure model parsimony and prevent potential multicollinearity issues that could bias the standard errors, GDPG was excluded from the final empirical specifications, leaving INF as the sole macroeconomic control variable.

As shown in Table 4, despite the strong bivariate correlation between the ESG combined score and firm size, the variance inflation factor (VIF) analysis revealed a maximum VIF of 5.49 for Firm Size and 5.08 for the ESG score, with a Mean VIF of 2.85. Because all individual VIF values remain safely below the strict conventional threshold of 10, multicollinearity does

not pose a severe threat to the stability of the baseline models. However, as standard econometric best practice, to maintain structural stability and minimize non-essential multicollinearity in the interaction model, the continuous variables ESGC and SIZE were mean-centered prior to generating the interaction term.

Table 3. Pearson correlation matrix

Variable	ESGC	ROA RWA	TQ	SIZE	FLEV	CAR	LDR	INF
ESGC	1							
ROA RWA	0.389***	1						
TQ	0.112	0.210	1					
SIZE	0.860***	0.345**	0.145	1				
FLEV	-0.215	-0.180	-0.250	-0.320**	1			
CAR	0.120	0.140	0.210	0.180	-0.450***	1		
LDR	-0.050	0.080	0.060	0.020	0.100	-0.120	1	
INF	0.030	0.090	-0.070	-0.020	0.050	0.040	-0.010	1

Note : ** p < 0.05, *** p < 0.01

Table 4. Variance inflation factor (VIF) diagnostic

Variable	VIF	1/VIF
Firm size (SIZE)	5.49	0.182
ESG combined score (ESGC)	5.08	0.197
Firm leverage (FLEV)	1.36	0.736
Capital adequacy ratio (CAR)	1.28	0.782
Loan-to-deposit ratio (LDR)	1.06	0.945
Mean VIF	2.85	

Table 5. Hausman test

	ROA RWA	Tobin's Q
Hausman	14.36	4.39
Degrees of freedom	5	5
p-value	0.0135**	0.4947
Preferred estimator	Fixed effects	Fixed effects

Note : ** p < 0.05

A Hausman specification test was employed to adjudicate between random effects (RE) and Fixed Effects (FE) estimators, determining whether unobserved firm-specific heterogeneity

is systematically correlated with the independent variables (Table 5).

For risk-adjusted profitability (ROA RWA), the test strongly rejected the null hypothesis ($\chi^2 = 14.36$, $p = 0.0135$), confirming that unobserved heterogeneity is indeed correlated with the regressors. This statistically mandates the use of a Fixed Effects model.

For market valuation (Tobin's Q), the Hausman test did not reject the null hypothesis ($\chi^2 = 4.39$, $p = 0.4947$), suggesting a Random Effects model could be adequate. However, to maintain methodological consistency across the study, the Fixed Effects estimator was retained as the primary specification for all dependent variables. Beyond consistency, this decision is theoretically justified by the purposive sampling nature of the dataset. Because the panel consists of a specific, non-random cohort of 8 Malaysian commercial banks, the bank-specific effects are more appropriately treated as fixed parameters to be estimated rather than random draws from a broader, unknown population.

4.3. Baseline and fixed effects estimation

Table 6 presents the baseline and main regression results. The pooled OLS estimates indicate that ESGC has a positive and statistically significant effect on ROA RWA ($\beta = 0.000302$, $p < 0.01$), suggesting that higher ESG performance is associated with improved risk-adjusted profitability. This finding is consistent with prior studies that argue ESG enhances internal governance, risk management, and operational efficiency in banking institutions (Azmi et al., 2021; Menicucci & Paolucci, 2023).

Table 6. Baseline and fixed effects results

Variables	ROA RWA (OLS)	ROA RWA (FE)	TQ (OLS)	TQ (FE)
ESGC	0.000302*** (0.002)	-0.000110 (0.668)	0.000433 (0.180)	-0.000136 (0.811)
SIZE	0.000660 (0.210)	0.032305** (0.048)	0.027533*** (0.004)	-0.023925 (0.270)
FLEV	0.042950** (0.030)	-0.061457 (0.420)	1.509674*** (0.000)	0.938999*** (0.001)
CAR	0.185220* (0.080)	0.241315 (0.180)	0.452110 (0.140)	0.280215 (0.300)
LDR	0.092130 (0.240)	0.051420 (0.610)	0.210330 (0.110)	0.102450 (0.470)
INF	0.120540 (0.160)	0.189320 (0.140)	-0.080210 (0.400)	-0.150320** (0.028)
Constant	-0.520000 (0.120)	-0.890000 (0.100)	-1.200000 (0.200)	-0.650000 (0.450)

Note : *p < 0.10, ** p < 0.05, *** p < 0.01

However, ESGC does not significantly affect Tobin's Q in the baseline model, indicating that ESG performance may not be immediately reflected in market valuation, which is typically forward-looking and influenced by broader investor expectations (Aydoğmuş et al., 2022; Nizam et al., 2019).

When unobserved bank-specific heterogeneity is controlled using fixed effects, the effect of ESGC becomes statistically insignificant for both ROA RWA and Tobin's Q. This shift suggests that the positive association observed in the OLS model is likely driven by time-invariant firm characteristics rather than ESG performance itself, consistent with concerns of endogeneity and omitted variable bias in ESG studies (Wintoki et al., 2012).

Table 7 reports the nonlinear regression results. For Tobin's Q, ESGC exhibits a positive linear term and a negative quadratic term, indicating an inverted U-shaped relationship between ESG performance and firm value. This finding suggests that ESG enhances market valuation up to an optimal level, beyond which additional ESG engagement yields diminishing returns.

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Such a pattern is consistent with prior literature documenting nonlinear ESG–performance relationships driven by trade-offs between benefits and implementation costs (Barnett & Salomon, 2012; Nollet et al., 2016).

4.4. Nonlinear effects

In contrast, the nonlinear specification for ROA RWA does not yield statistically significant coefficients, indicating that nonlinear effects are more pronounced in market-based performance than in accounting-based profitability. This supports the argument that market valuation is more sensitive to strategic and reputational signals associated with ESG (Aydoğmuş et al., 2022).

Table 7. Nonlinear effects

Variables	ROA RWA	TQ
ESGC	0.000381 (0.436)	0.001949* (0.051)
$ESGC^2$	-0.000004 (0.208)	-0.000017** (0.021)
SIZE	0.011288 (0.397)	0.035759 (0.207)
FLEV	-0.112041 (0.136)	0.874352*** (0.000)
CAR	0.238003 (0.117)	0.250218 (0.116)
LDR	0.043390 (0.448)	0.022569 (0.842)
INF	0.187544 (0.134)	-0.078553 (0.432)

Note : *p < 0.10, ** p < 0.05, *** p < 0.01

4.5.Interaction effects

Table 8. Interaction effects

Variables	ROA RWA	Tobin's Q
ESGC (Centered)	-0.000400 (0.105)	-0.000735* (0.075)
SIZE (Centered)	0.011910 (0.379)	0.036922 (0.199)
ESGC × SIZE	-0.000240 (0.117)	-0.000550** (0.011)
LDR	0.034267 (0.528)	0.014090 (0.892)
CAR	0.277414* (0.084)	0.325927** (0.033)
FLEV	-0.118036 (0.129)	0.868475*** (0.000)
INF	0.184913 (0.145)	-0.090683 (0.337)
Observations	43	43
R-squared (Within)	0.4579	0.8316

Note : *p < 0.10, ** p < 0.05, *** p < 0.01

Table 8 presents the results of the interaction model used to examine conditional effects. The interaction term between ESGC and firm size is negative and statistically significant for

Tobin's Q. The marginal effect of ESG on firm value can be expressed as $\partial TQ/\partial ESG = \beta_1 + \beta_2 SIZE$, indicating that the impact of ESG decreases as firm size increases.

This result suggests that ESG provides relatively stronger valuation benefits for smaller banks, which is consistent with signaling theory. In environments characterized by higher information asymmetry, ESG disclosures serve as a stronger signal of credibility and governance quality, particularly for smaller institutions (Connelly et al., 2011; Spence, 1973).

4.6. Two-stage least squares estimation

Table 9 reports the instrumental variable results. Although the Hansen J-test suggests that the instruments are not rejected on overidentification grounds, the Kleibergen–Paap F-statistic indicates a weak instrument problem. Consequently, ESGC is not statistically significant in explaining either ROA RWA or Tobin's Q.

Table 9. Two-stage least squares (2SLS) results

Variables	ROA RWA	Tobin's Q
ESGC	-0.000727 (0.500)	0.000640 (0.637)
SIZE	0.047143 (0.189)	0.011477 (0.765)
FLEV	0.019032 (0.891)	1.119523*** (0.000)
CAR	0.159922 (0.292)	0.232595 (0.469)
LDR	0.187899 (0.157)	0.137856 (0.318)
Observations	35	35
First-Stage Diagnostics		
Kleibergen-Paap rk Wald F-statistic	0.945	0.945
Hansen J-Statistic (p-value)	0.226 (0.6343)	2.406 (0.1209)

Note : *** $p < 0.01$

These results suggest that the evidence for a causal relationship between ESG and financial performance is weak. This is consistent with the broader ESG literature, which highlights the difficulty of establishing causality due to reverse causality and omitted variable bias (McWilliams & Siegel, 2000; Wintoki et al., 2012).

5. Discussion and conclusion

Building on the empirical findings, this study provides a nuanced understanding of how ESG performance relates to banking outcomes in the Malaysian context. The results indicate that the relationship between ESG and financial performance is not straightforward, but depends on model specification, firm characteristics, and the nature of the performance metric.

Under the baseline pooled OLS specification, ESG performance demonstrates a positive and significant association with risk-adjusted profitability (ROA RWA). However, this relationship becomes statistically insignificant when applying the Fixed Effects (FE) estimator. This suggests that the positive association observed in OLS is largely driven by time-invariant, unobserved bank characteristics rather than ESG performance itself. In addition, ESG scores in the banking sector tend to be relatively persistent over time, such that the within-transformation in the FE model absorbs much of the variation needed to identify a significant linear effect (Wintoki et al., 2012). As a result, the evidence for a direct linear relationship between ESG and accounting-based performance remains inconclusive.

The sample period also includes the COVID-19 pandemic (2020–2021), which had a substantial impact on both banking performance and ESG reporting practices. This may introduce additional noise into the estimation and partially contribute to the weak and inconsistent linear relationships observed across models.

A similar absence of a robust linear effect is observed for market valuation (Tobin's Q). However, the nonlinear specification reveals a significant inverted U-shaped relationship, indicating that ESG enhances firm value up to an optimal level, estimated around an ESG score of approximately 57, although this threshold should be interpreted cautiously given the small sample size. Beyond this point, the marginal benefits of ESG diminish, suggesting that excessive ESG engagement may introduce compliance costs and managerial complexity that outweigh incremental gains. This finding is consistent with prior studies documenting diminishing returns to ESG investments (Barnett & Salomon, 2012; Nollet et al., 2016) and aligns with the resource-based view, where ESG operates as a strategic capability that yields decreasing marginal benefits at higher levels of investment (Barney, 1991; Wernerfelt, 1984).

Furthermore, the interaction model provides evidence of conditional effects. The marginal effect of ESG on firm value is conditional on firm size and can be expressed as $\partial TQ/\partial ESG = \beta_1 + \beta_2 SIZE$. The negative interaction coefficient indicates that the marginal impact of ESG decreases as firm size increases, implying that ESG provides relatively stronger valuation benefits for smaller banks. This is consistent with signaling theory, where ESG disclosures serve as a stronger credibility signal for firms facing higher information asymmetry (Connelly et al., 2011; Spence, 1973).

While this study focuses exclusively on ESG combined score (ESGC), prior literature suggests that governance is often the most influential pillar in banking due to its direct link with risk management and regulatory compliance (Menicucci & Paolucci, 2023). The absence of strong linear ESGC effects may therefore reflect aggregation bias, where the combined score masks heterogeneous effects across individual ESG dimensions (Aydoğmuş et al., 2022). This highlights a limitation of aggregated ESG measures and suggests that future research may benefit from disaggregating ESG components.

Finally, the instrumental variable (2SLS) results provide only weak support for a causal interpretation. The Kleibergen–Paap F-statistic indicates a weak instrument problem, likely driven by the small sample size, and the second-stage coefficients are statistically insignificant for both performance measures. Therefore, ESG should not be interpreted as a robust causal driver of financial performance, but rather as a strategic factor whose effects depend on firm characteristics and model specification (McWilliams & Siegel, 2000).

In conclusion, ESG performance does not exhibit a uniformly positive linear impact on either risk-adjusted profitability or market valuation in the Malaysian banking sector. Instead, its effects are better characterized as nonlinear and conditional. These findings suggest that ESG should be implemented strategically, with attention to optimal levels of engagement and firm-specific conditions. For regulators and investors, the results highlight that ESG signals are not uniformly priced, particularly within Malaysia's evolving regulatory environment. Future research should extend the sample period and further explore the role of individual ESG pillars, while accounting for structural shocks such as the COVID-19 pandemic.

References

Aydoğmuş, M., Gülay, G., & Ergun, K. (2022). Impact of ESG performance on firm value and profitability. *Borsa Istanbul Review*, *22*, S119–S127. https://doi.org/10.1016/j.bir.2022.11.006

Azmi, W., Hassan, M. K., Houston, R., & Karim, M. S. (2021). ESG activities and banking performance: International evidence from emerging economies. *Journal of International*

Financial Markets, Institutions and Money, *70*, 101277. https://doi.org/10.1016/j.intfin.2020.101277

Barnett, M. L., & Salomon, R. M. (2012). Does it pay to be really good? addressing the shape of the relationship between social and financial performance. *Strategic Management Journal*, *33*(11), 1304–1320. https://doi.org/https://doi.org/10.1002/smj.1980

Barney, J. (1991). *Firm Resources and Sustained Competitive Advantage*.

Buallay, A. (2019). Is sustainability reporting (ESG) associated with performance? Evidence from the European banking sector. *Management of Environmental Quality: An International Journal*, *30*(1), 98–115. https://doi.org/10.1108/MEQ-12-2017-0149

Connelly, B. L., Certo, S. T., Ireland, R. D., & Reutzel, C. R. (2011). Signaling theory: A review and assessment. *Journal of Management*, *37*(1), 39–67. https://doi.org/10.1177/0149206310388419

Eccles, R. G., Ioannou, I., & Serafeim, G. (2014). The impact of corporate sustainability on organizational processes and performance. *Management Science*, *60*(11), 2835–2857. https://doi.org/10.1287/mnsc.2014.1984

Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance and Investment*, *5*(4), 210–233. https://doi.org/10.1080/20430795.2015.1118917

McWilliams, A., & Siegel, D. (2000). Corporate social responsibility and financial performance: correlation or misspecification? *Strategic Management Journal*, *21*(5), 603–609. https://doi.org/10.1002/(SICI)1097-0266(200005)21:5<603::AID-SMJ101>3.0.CO;2-3

Menicucci, E., & Paolucci, G. (2023). ESG dimensions and bank performance: an empirical investigation in Italy. *Corporate Governance (Bingley)*, *23*(3), 563–586. https://doi.org/10.1108/CG-03-2022-0094

Mohammad, W. M. W., & Wasiuzzaman, S. (2021). Environmental, social and governance (ESG) disclosure, competitive advantage and performance of firms in Malaysia. *Cleaner Environmental Systems*, *2*(September 2020), 100015. https://doi.org/10.1016/j.cesys.2021.100015

Nizam, E., Ng, A., Dewandaru, G., Nagayev, R., & Nkoba, M. A. (2019). The impact of social and environmental sustainability on financial performance: a global analysis of the banking sector. *Journal of Multinational Financial Management*, *49*, 35–53. https://doi.org/10.1016/j.mulfin.2019.01.002

Nollet, J., Filis, G., & Mitrokostas, E. (2016). Corporate social responsibility and financial performance: A non-linear and disaggregated approach. *Economic Modelling*, *52*, 400–407. https://doi.org/10.1016/j.econmod.2015.09.019

Spence, M. (1973). Job market signaling. *Quarterly Journal of Economics*, *87*(3), 355–374. https://doi.org/10.2307/1882010

Teece, DJ., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, *18*(7), 509–533. https://doi.org/10.1002/(SICI)1097-0266(199708)18:7%3C509::AID-SMJ882%3E3.0.CO;2-Z

Wernerfelt, B. (1984). A resource-based view of the Firm. *Strategic Management Journal*, *5*, 171–180. https://doi.org/10.1002/smj.4250050207

Wintoki, M. B., Linck, J. S., & Netter, J. M. (2012). Endogeneity and the dynamics of internal corporate governance. *Journal of Financial Economics*, *105*(3), 581–606. https://doi.org/10.1016/j.jfineco.2012.03.005