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Relationship between ESG and Financial Performance: A Study of Listed Companies on the Stock Exchange of Thailand in SET ESG Index

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Abstract

This research investigates the relationship between ESG (Environment, Social and Governance) and the financial performance of the companies listed on the stock exchange of Thailand in SET ESG Index by considering ESG Score (both Total ESG Score and each pillar scores) assessed by ESG Book GmbH and 4 financial performances i.e. Return on Assets, Return on Equity, Return on Sales and Tobin's Q of the companies listed on the stock exchange of Thailand in SET ESG Index for a period of 3 years from 2020 to 2022.

This study showed that the total ESG Score, and G Score have a significant positive relationship with Tobin's Q. However, the company with high ESG Scores and high foreign shareholding ratio will have significant negative impact on Tobin's Q. The company with a high S Score will have a significant negative relationship with Return on Sales, however the relationship with Return on Sales will be positive if that company also has a higher foreign shareholding ratio. This study found that none of the ESG Scores or variables has a significant relationship with Return on Equity.

Keywords: ESG, sustainability, firm value, firm performance

Introduction and research background

Under the stockholder theory, the company maximize its profits and value of the stockholders through the increasing of profit only so long as it stays within the rules of game (Friedman, 2020). However, the concerns from the other stakeholders, including the employees, the suppliers, the customers, and the local community were also take into accounts in the stakeholder theory (Freeman, 2001). As the interest of the other stakeholders has been adopted and

developed over time, many companies focus on corporate social responsibility (CSR) and consider the impact that may occur to the ESG because the company with ESG can benefit from good corporate reputation and attracting talent (Zumente & Bistrova, 2021).

Internationally, the Climate-related Disclosures requirements in International Financial Reporting Standards S2 (IFRS S2) are effective for annual reporting periods beginning on or after 1 January 2024 (meaning an entity would report its first sustainability related disclosures in 2025 (Sireethorn, 2023).

In Thailand, all listed companies were required to include the sustainability management report prescribing (i) policy and goal for sustainability management (ii) management of the effects to value chain and stakeholders' interest (iii) sustainability management in the dimension of environment and the social into its public disclosure report for the fiscal year ended on 31 December 2021 onward.

Despite the requirements, questions remain about whether ESG practices improve financial performance or are solely focused on non-financial outcomes. This study aims to determine if investing in ESG-focused companies is profitable and leads to financial gains alongside ESG impacts.

This study recommends integrating ESG, especially governance, into core strategies to enhance long-term financial performance. Investors should prioritize companies with strong ESG practices, and regulators should enforce consistent reporting standards. The study analyzes ESG's impact on financial metrics (ROA, ROE, ROS, Tobin's Q) in Thai companies on the SET ESG Index, noting that strong governance boosts long-term performance, though some social initiatives may affect short-term ROS. However, potential limitations include the short three-year study period, which may not fully capture long-term ESG impacts, and survivorship bias, as only companies consistently listed on the SET ESG Index were analyzed. This could overestimate positive ESG effects, highlighting the need for caution in interpreting the results and for future research with longer timeframes and broader samples.

In this research, clarity and consistency in the use of ESG metrics are prioritized. Environmental (E), Social (S), and Governance (G) metrics are clearly defined to ensure precision. Standardized financial indicators such as ROA, ROE, and Tobin's Q are consistently applied to assess the link between ESG performance and financial outcomes. A uniform ESG scoring system is used to enable comparability across sectors and firms. Established frameworks are adopted to ensure consistent ESG reporting. Additionally, the relationship between ESG metrics and financial performance is clearly explained, distinguishing between short-term and long-term impacts to enhance the research's rigor and comparability.

Literature review and research questions

Theoretical Foundations of Underlying Research on ESG Activity

ESG activities, as disclosed in annual reports to the Stock Exchange of Thailand (SET), are categorized according to SET guidelines based on the United Nations Sustainable Development Goals (UN-SDGs) and the Global Reporting Initiative Standard (GRI Standard). These activities are classified into three dimensions: Environmental, Social, and Governance (ESG).

Environmental Activity and Financial Performance

Environmental factors in ESG are linked to financial performance through transparency and strong environmental

practices, which can enhance profitability (Meng et al., 2014). Companies with robust environmental practices often achieve higher return on equity (ROE) and financial success (Kraus et al., 2020). Additionally, environmental strategies and green innovation mediate the CSR-environmental performance relationship, contributing to better financial outcomes (Xie et al., 2019).

Social Activity and Financial Performance

The "S" in ESG includes social factors like labor practices and community engagement (Eccles et al., 2020). Social initiatives can boost a company's reputation and financial performance by improving employee loyalty and customer satisfaction (Kabir & Thai, 2017). However, their impact on financial metrics like return on assets and equity varies by industry, firm size, and geography, with mixed results (Tyagi, 2012).

Governance Activity and Financial Performance

Governance, the "G" in ESG, covers board composition, executive compensation, and risk management, which are vital for long-term financial performance (Huang, 2021). Strong governance enhances risk management and transparency, leading to better financial outcomes (Abdi et al., 2020). Companies with good governance are more attractive to investors due to their potential for sustainable returns and lower risk (Jitaree, 2015).

Theoretical Foundations of Underlying Research on Financial Performance

Return on Assets (ROA)

Return on Assets (ROA) measures profitability relative to assets, indicating efficiency in generating profits (Yang et al., 2010; Huang, 2021). Studies link ESG disclosure to higher ROA and stronger financial performance (Alareeni & Hamdan, 2020). This study will use ROA to assess ESG disclosure's impact on financial performance in Thailand, using EBIT for industrial and service sectors, and EBT for others, scaled by average total assets.

Return on Equity (ROE)

Return on Equity (ROE) measures a company's profitability relative to shareholders' equity, reflecting how efficiently it generates profits from shareholder capital (McGuire et al., 1988). A higher ROE indicates effective use of equity, making it a key metric for comparing financial performance within industries (Yang et al., 2010). Studies suggest that companies with higher ESG ratings typically achieve higher ROE, demonstrating the positive impact of sustainability and governance on long-term profitability (Alareeni & Hamdan, 2020; Yang et al., 2010).

Return on Sales (ROS)

Return on Sales (ROS) measures profit per dollar of sales, indicating a company's efficiency in generating profits from core operations (McGuire et al., 1988). Higher ROS signals strong financial performance, while lower ROS suggests inefficiency. Studies show a positive correlation between ROS and ESG scores, with higher ESG ratings linked to better financial outcomes (Kocherlakota et al., 2023). Analyzing ROS alongside other metrics provides a comprehensive view of financial health, and high ROS reflects effective operations, which is favorable for investors and stakeholders (Batchimeg, 2017).

Tobin's Q

Tobin's Q compares a company's market value to its replacement cost, indicating investment efficiency (Lindenberg & Ross, 1981). A ratio above one suggests efficiency, while below one indicates inefficiency (Chung & Pruitt, 1994). Strong ESG performance is linked to higher Tobin's Q, reflecting better

investment efficiency (Abdi et al., 2020). This study will use Tobin's Q to assess the financial performance of companies on the SET ESG Index.

Control Variables

Research indicates that firm size, industry type, age, leverage, foreign shareholding, GDP, and inflation significantly influence the relationship between ESG scores and financial performance (Jitaree, 2015; McWilliams & Siegel, 2000). This study incorporates these factors as control variables.

Firm Size (SIZE)

Firm size impacts financial performance, with larger firms often demonstrating better efficiency due to economies of scale and greater resources. It is commonly measured using the natural logarithm of total assets or market capitalization (Andersen & Dejoy, 2011; Reverte, 2009).

Industry Type (INDUS)

Industry type affects the sustainability performance of firms, with manufacturing sectors typically facing higher ESG risks. This study classifies industries into manufacturing and non-manufacturing, assigning a value of "1" for manufacturing and "0" for non-manufacturing (Chang & Kuo, 2008).

Age of Firm (AGE)

Firm age, representing a company's lifecycle stage, influences its financial performance and ESG activities. Older firms often perform better in long-term investments, making firm age a critical control variable in this study (Jitaree, 2015).

Debt/Equity Ratio (LEV)

Leverage, measured by the debt-to-equity ratio, affects a firm's financial disclosures and cost of capital. Firms with higher leverage may disclose more ESG information to reduce agency costs and capital expenses (Reverte, 2009).

Foreign Shareholding (FOR)

Foreign shareholding can positively impact firm performance by bringing in expertise, capital, and improved governance practices, though it may also pose challenges like prioritizing short-term gains (Ahmadjian, 2007).

Gross Domestic Product (GDP)

GDP growth affects firm performance through increased consumer demand, investment opportunities, and access to credit, but also introduces risks related to inflation and exchange rates (Aghion & Howitt, 2008).

Inflation (INF)

Inflation raises production costs, reduces profit margins, and lowers consumer purchasing power, decreasing demand and revenue (Almansour et al., 2021). Firms must adjust pricing and manage costs to stay profitable, while also navigating higher interest rates and borrowing costs. Quick adaptation to these challenges is crucial for maintaining a competitive edge.

The literature highlights that inflation significantly affects firm financial performance by increasing production costs, squeezing profit margins, and diminishing consumer demand, which can adversely impact revenues. These findings underscore the importance of considering inflation as a key variable in financial performance analysis. In this study, inflation, along with other control variables such as firm size, industry type, and leverage, will be examined in relation to ESG performance to better understand how these factors collectively influence financial outcomes. This comprehensive approach aims to provide nuanced

insights into the interplay between ESG factors and financial performance, particularly in the context of inflationary pressures.

However, to the best of my knowledge, there is no study on the relationship between each ESG activity and the financial performance of the listed company in SET ESG Index in Thailand specifically. Based on the above research gap, this study will try to find the answer for the following research questions:

- Does ESG have a relationship with the company's financial performance?
- What are the effects of each pillar of ESG on the company's financial performance?

Research model and hypotheses

Research model

The literature on the link between ESG actions and a company's financial success is examined. The ESG and Sub-ESG scores are all considered. The four metrics used to gauge financial success are return on assets, return on equity, return on sales, and Tobin's Q. This study's research framework in measuring the relationship between ESG scores and financial performance is illustrated in Figure 1.

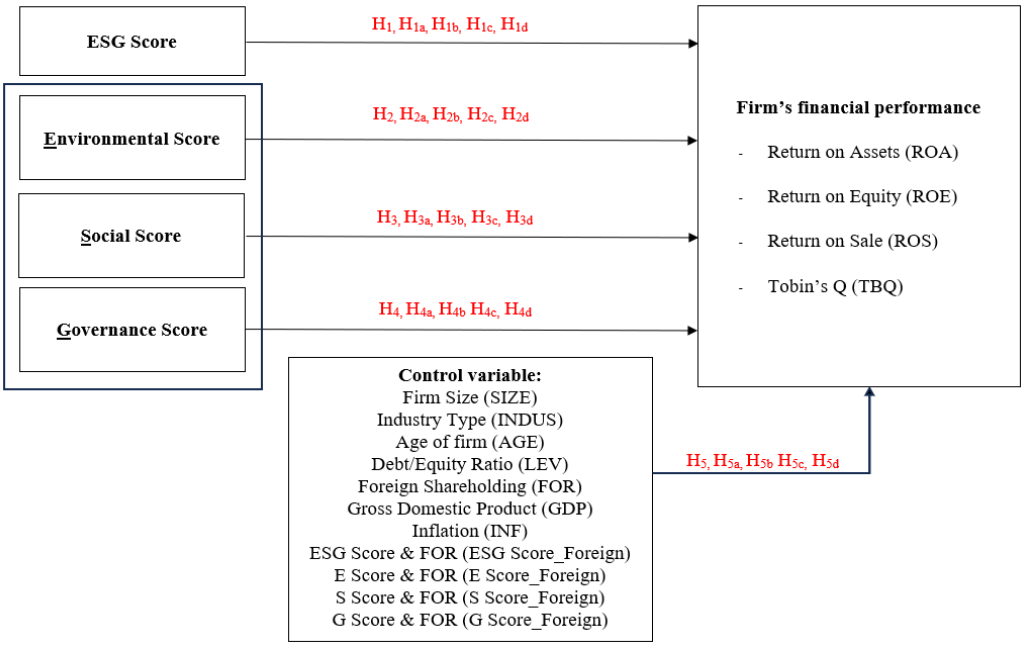

Figure 1 Relationship between ESG Conceptual Framework and the firm's financial performance

Hypotheses

The hypothesis defines ESG score and each pillar Score as independent variable. The hypotheses are as follows:
H1: There is a significant relationship between ESG score and financial performance.
H2: There is a significant relationship between E score and financial performance.
H3: There is a significant relationship between S score and financial performance.
H4: There is a significant relationship between G score and financial performance.
H5: There is a significant relationship between control variables and financial performance.

The hypotheses suggest that a company's ESG performance significantly influences its financial outcomes. Higher ESG scores are expected to boost financial performance by strengthening stakeholder relationships, improving efficiency, and ensuring sound governance. Control variables like firm size, industry, age, leverage, and economic factors are included to accurately isolate ESG's impact on financial performance, providing a solid framework for exploring this relationship.

Research design

The study investigates the relationship between the ESG scores of Thai companies listed under the SET ESG Index and their financial performance, using accounting-based metrics like ROE, ROA, and ROS, along with Tobin's Q, which reflects market value relative to replacement cost (Tobin, 1969; Margolis & Walsh, 2001). It includes 56 companies consistently assessed by ESG Book GmbH from 2020 to 2022. ESG scores and sub-scores from ESG Book GmbH are used to measure ESG activity, while financial performance is evaluated using ROE, ROA, ROS, and Tobin's Q to determine the relationship between ESG scores and these metrics.

Population and samples

The population used in this study were all companies listed in the Stock Exchange of Thailand Listed under SET ESG Index every year from year 2020 to 2022 which using ESG Book as their sustainability data platform, totaling 168 set of data. It is covering a span of 3 years of 56 companies.

Data collection

Data collection from secondary data by collecting the financial statements of companies and One Report of the companies listed on SET ESG Index. For ESG Score and Sub-Score, this data is proprietary data of ESG Book which the researcher obtained from ESG Book GmbH[1]. Financial data and ESG scores were sourced from the Stock Exchange of Thailand (SET) and related publications.

[1]ESG Book GmbH is a limited liability company incorporated under the laws of Germany in Frankfurt in 2018. ESG Book offers a wide range of ESG-related data, scoring, and technology products that are used by many of the world's largest financial institutions covering over 100,000 companies.

Screening data

According to the Stock Exchange of Thailand (2023), 619 companies are listed on the SET, with 289 classifieds as ESG Investments. Of these, 114 were selected for the SET ESG Index, and only 58 have been consistently listed since 2020, following the Capital Commission's requirement for ESG disclosure in annual reports.

Research tools

The study on relationship of the ESG Score and financial performance of the companies listed on SET ESG Index used the following variables:

Independent variables

The independent variables were ESG Score and Sub-Score of the companies listed on the Stock Exchange of Thailand in the SET ESG Index every year from year 2020 to year 2022 by using ESG Book database. The independent variables were ESG Scores in 4 aspects:

1. Total ESG Score
2. Environmental Score which can be assessed from ESG Score on Environment i.e. emission, environmental stewardship, resource use, environmental solutions and waste, water and environmental management.
3. Social Score which can be assessed from ESG Score on Social i.e. diversity, training & development, community relations, product access, product quality & safety, human rights, labour rights, compensation, employment quality, occupational health and safety.
4. Corporate Governance Score which can be assessed from ESG Score on Governance i.e. business ethics, corporate governance, transparency, forensic accounting, and capital structure.

Dependent variables

The dependent variable is enterprise value in 4 aspects:

1. Return on Equity (ROE), which is an indicator for measuring the ability to make profit from the money invested by the shareholders by considering from Net Income / Shareholders' Equity.
2. Return on Assets (ROA), which is a measurement of efficiency of the firm's profitability from its assets by considering from Net Income / Average Total Assets.
3. Return on Sales (ROS), which is an indicator of the financial efficiency from the sale turnover by considering from Operating Profit / Net Sales x 100.
4. Tobin's Q, a financial ratio that measures performance in terms of market value based on information from financial statements. By measuring the market value of Tobin's Q ordinary shares, the calculation formula is (sum of market value of ordinary shares + market value of preferred shares + market value of liabilities)/book value of assets.

Control variables

The control variables are as follows: -

1. Firm Size (SIZE) describes the size of a company which is formulated based on the natural logarithm of the company's total assets or market capitalization.
2. Industry Type (INDUS) A dummy represents a firm classified as belonging to the manufacturing industries, the corresponding variable is assigned a value of "1". Conversely, if a company is not classified as belonging to the manufacturing industries, the variable is assigned a value of "0".
3. Age of Firm (AGE) is quantified as the duration in years after the firm's first listing on the Stock Exchange of Thailand.
4. Debt/Equity Ratio (LEV) Leverage refers to a company's use of borrowed funds. It is measured by the ratio of total

liabilities to the net worth of the company.
5. Foreign Shareholding (FOR) Foreign shareholding refers to the percentage of the common shares held by the foreign shareholders in the companies at the end of each year during 2021-2022.
6. Gross Domestic Product (GDP) GDP refers to Thailand's gross domestic product which is a monetary measure of the market value of all the final goods and services produced in Thailand in 2021-2022.
7. Inflation (INF) Inflation refers to a general increase in the prices of goods and services in an economy of Thailand during 2020-2022 measured using the consumer price index (CPI).
8. ESG Score interacting with Foreign Shareholding (ESG Score_Foreign) refers to the interaction between total ESG Score and the foreign shareholding ratio in the company.
9. E Score interacting with Foreign Shareholding (E Score_Foreign) refers to the interaction between E Score and the foreign shareholding ratio in the company.
10. S Score interacting with Foreign Shareholding (S Score_Foreign) refers to the interaction between S Score and the foreign shareholding ratio in the company.
11. G Score interacting with Foreign Shareholding (G Score_Foreign) refers to the interaction between G Score and the foreign shareholding ratio in the company.

Analysis techniques

This study used two data analysis methods:
1. Descriptive Statistics: Max, Mean, Min, SD, and Median were used to describe the fundamental data of each company.
2. Inferential Statistical Analysis:
- Pearson Correlation: Analyzed the relationship between independent and dependent variables, as well as among independent variables.
- Multiple Regression and Correlation: Assessed the impact of ESG activities on financial performance.
- Pooled OLS and Random Effect Models: Used for panel data analysis, selecting the appropriate regression model, and addressing multicollinearity issues.
The analysis was conducted using Gretl 2023a to test the hypotheses and confirm the model's influence on the dependent variable.
3. The Model and Hypotheses Testing
To test the assumption relating to the relationship between ESG and firm's financial performance of the listed companies in SET ESG Index as prescribed above, this research uses regression models as follows.

$$ROA = \beta0+\beta1ESG_{it} + \beta2SIZE_{it} + \beta3INDUS_{it}+ \beta4AGE_{it}+\beta5LEV_{it}+ \beta6FOR_{it} +\beta7GDP_{t} + \beta8INF_{t} + \beta9ESG\ Score_Foreign_{it} +e_{it}$$

$$ROE = \beta0+\beta1ESG_{it} + \beta2SIZE_{it} + \beta3INDUS_{it}+ \beta4AGE_{it}+ \beta5LEV_{it}+ \beta6FOR_{it} + \beta7GDP_{t} + \beta8INF_{t}+ \beta9ESG\ Score_Foreign_{it} +e_{it}$$

$$ROS = \beta0+ \beta1ESG_{it} + \beta2SIZE_{it} + \beta3INDUS_{it}+ \beta4AGE_{it}+ \beta5LEV_{it}+ \beta6FOR_{it} + \beta7GDP_{t} + \beta8INF_{t} + \beta9ESG\ Score_Foreign_{it} +e_{it}$$

$$TBQ = \beta0+\beta1ESG_{it} + \beta2SIZE_{it} + \beta3INDUS_{it}+ \beta4AGE_{it}+ \beta5LEV_{it}+ \beta6FOR_{it} + \beta7GDP_{t} + \beta8INF_{t} + \beta9ESG\ Score_Foreign_{it} +e_{it}$$

$$ROA = \beta0+\beta1ENV_{it}+ \beta2SOCIAL_{it}+ \beta3GOV_{it}+ \beta4SIZE_{it} + \beta5INDUS_{it}+ \beta6AGE_{it}+ \beta7LEV_{it}+ \beta8FOR_{it} + \beta9GDP_{t}$$

$+ \beta 10INF_t + \beta 11E\ Score_Foreign_{it} + \beta 12S\ Score_Foreign_{it} + \beta 13G\ Score_Foreign_{it} + e_{it}$

$ROE = \beta 0+\beta 1ENV_{it}+ \beta 2SOCIAL_{it}+ \beta 3GOV_{it}+ \beta 4SIZE_{it} + \beta 5INDUS_{it}+ \beta 6AGE_{it}+ \beta 7LEV_{it}+ \beta 8FOR_{it} + \beta 9GDP_t + \beta 10INF_t + \beta 11E\ Score_Foreign_{it} + \beta 12S\ Score_Foreign_{it} + \beta 13G\ Score_Foreign_{it} + e_{it}$

$ROS = \beta 0+\beta 1ENV_{it}+ \beta 2SOCIAL_{it}+ \beta 3GOV_{it}+ \beta 4SIZE_{it} + \beta 5INDUS_{it}+ \beta 6AGE_{it}+ \beta 7LEV_{it}+ \beta 8FOR_{it} + \beta 9GDP_t + \beta 10INF_t + \beta 11E\ Score_Foreign_{it} + \beta 12S\ Score_Foreign_{it} + \beta 13G\ Score_Foreign_{it} + e_{it}$

$TBQ = \beta 0+\beta 1ENV_{it}+ \beta 2SOCIAL_{it}+ \beta 3GOV_{it}+ \beta 4SIZE_{it} + \beta 5INDUS_{it}+ \beta 6AGE_{it}+ \beta 7LEV_{it}+ \beta 8FOR_{it} + \beta 9GDP_t + \beta 10INF_t + \beta 11E\ Score_Foreign_{it} + \beta 12S\ Score_Foreign_{it} + \beta 13G\ Score_Foreign_{it} + e_{it}$

Where:

$\beta 0$ = Intercept coefficient
$\beta 1 - \beta 10$ = Coefficient for each of the independent variables
ESG_{it} = ESG score of Firm *i* at time *t*
ENV_{it} =environmental score of Firm *i* at time *t*
$Social_{it}$ = social score of Firm *i* at time *t*
Gov_{it} = corporate governance score of Firm *i* at time *t*
ROA_{it} = Return on Assets of Firm *i* at time *t*
ROE_{it} = Return on Equity of Firm *i* at time *t*
ROS_{it} = Return on Sales of Firm *i* at time *t*
TBQ_{it} = Tobin's Q of Firm *i* at time *t*
$SIZE_{it}$ = Logarithm of the company's total assets or market capitalization of Firm *i* at time *t*
$INDUS_{it}$ = Dummy represents 0 for manufacturing sectors and 1 for non-manufacturing sectors of Firm *i* at time *t*
AGE_{it} = The age of a business of Firm *i* at time *t*
LEV_{it} = Debt to Equity Ratio of Firm *i* at time *t*
FOR_{it} = Foreign shareholding percentage of Firm *i* at time *t*
GDP_t = Gross Domestic Product amount of Thailand at time *t*
INF_t = Inflation rate of Thailand at time *t*
ESG $Score_Foreign_{it}$ = Interaction between total ESG Score and the foreign shareholding ratio of Firm *i* at time *t*
E $Score_Foreign_{it}$ = Interaction between E Score and the foreign shareholding ratio of Firm *i* at time *t*
S $Score_Foreign_{it}$ = Interaction between S Score and the foreign shareholding ratio of Firm *i* at time *t*
G $Score_Foreign_{it}$ = Interaction between G Score and the foreign shareholding ratio of Firm *i* at time *t*

Results

Descriptive data

The descriptive statistics of variables from the year 2020 to 2022 are shown in Table 1 below.

Table 1 Data Distribution (N= 168)

Variables	Mean	Median	S.D.	Min	Max
ESG (point)	57.08	57.77	7.541	2.180	73.56
E Score (point)	62.35	63.16	9.649	2.230	81.06
S Score (point)	62.68	61.99	5.250	47.64	73.17
G Score (point)	51.25	51.23	13.21	20.51	79.33
Size (%)	11.82	11.80	1.638	7.807	15.30
Indus (Dummy)	0.6250	1.000	0.4856	0.0000	1.000
Age (Years)	21.75	22.50	11.85	3.000	47.00
Lev (time)	0.5668	0.650	0.1969	0.1300	0.8900
GDP (Billion THB)	13209	14219	1806	10680	14729
Inflation (%)	2.153	1.230	2.912	-0.8500	6.080
Foreign (%)	19.00	13.05	15.96	1.195	71.60
ROA (%)	6.639	5.715	5.810	-9.530	58.46
ROE (%)	10.25	9.235	10.80	-30.06	41.11
ROS (%)	15.08	11.61	19.06	-156.7	69.87
TBQ	1.612	1.150	1.075	0.680	6.270

The variables showed significant deviations, with G Score ranging from 20.51 to 79.33, ESG Score from 2.18 to 73.56, Age from 3 to 47 years, and Foreign Shareholding from 1.19% to 71.60%. Financial performance varied widely, with ROA from -9.53% to 58.46%, ROE from -30.06% to 41.11%, ROS from -156.7% to 69.87%, and Tobin's Q from 0.68 to 6.27. The highest standard deviation was for the G Score (13.21) and ROS (19.06%). The mean and median ESG Scores were close, reflecting consistent ESG practices among firms listed on the SET ESG Index for three consecutive years. The average firm age was 21.75 years, with a standard deviation of 11.85, indicating that many firms engage in ESG within 21 years of establishment. The mean foreign shareholding was 19% (SD = 15.96%), suggesting most shares are held by Thai nationals. Lastly, leverage was relatively low at 0.57 times, indicating low liabilities compared to capital.

Testing for multicollinearity

Multicollinearity testing ensures that independent variables are not highly correlated. A correlation coefficient above 0.8 or 0.9 indicates a serious issue (Gujarati & Porter, 2009). Table 2 shows the correlation coefficients and significance levels of independent variables for 2020, 2021, and 2022.

Table 2 Correlation coefficients from multicollinearity testing

	E Score	S Score	G Score	Size	Industry	Age	Leverage	GDP	Inflation	Foreign	ROA	ROE	ROS	TBQ
ESG	0.4470	0.2827	0.7294	-0.1436	-0.5710	0.0434	-0.3584	-0.1774	-0.2017	-0.1341	0.1594	0.0952	-0.0175	0.2187
E Score		0.4896	-0.1856	0.3031	0.2261	0.1737	0.0900	0.0310	-0.0005	-0.0753	-0.1631	-0.1606	-0.1518	-0.3046
S Score			-0.1357	0.3455	-0.0124	0.4532	0.0873	0.0027	0.0021	0.0298	-0.1307	-0.1720	-0.0824	-0.2493
G Score				0.3609	-0.1420	-0.1814	-0.4646	-0.2158	-0.2002	-0.1020	0.2868	0.2413	0.0382	0.4665
Size					-0.1964	0.4186	0.6066	-0.0347	-0.0495	0.2015	-0.3096	-0.1156	-0.0630	-0.2816
Industry						-0.2943	-.02818	0.0000	-0.0000	-0.1095	0.1714	-0.0819	-0.1622	-0.2939
Age							0.1668	-0.0555	-0.0674	0.1015	-0.0754	-0.0775	0.0805	-0.2099
Leverage								-0.0216	-0.0322	0.1060	-0.4104	-0.1003	0.1499	-0.2776
GDP									0.6475	0.0104	-0.0467	-0.0634	0.0100	-0.0036
Inflation										0.0260	-0.0570	-0.1014	0.0704	-0.0198
Foreign											-0.0024	-0.0857	-0.0453	0.0145
ROA												0.8069	0.1418	0.2585
ROE													0.1013	0.2542
ROS														-0.0508

Table 2 shows the correlation matrix for 2020-2022. The highest correlation, 0.7294 between ESG and G Score, suggests that multicollinearity is unlikely, as it is below 0.8. The correlations between Industry and GDP, and Industry and Inflation are both 0.000, further indicating an absence of multicollinearity.

Pool OLS multiple regression result

Result and analysis based on the total ESG Score

The results of the Pool OLS multiple regression are shown in Table 3 below.

Table 3 Pool OLS multiple regression analysis result from total ESG Score

	ROA	ROE	ROS	TBQ
Constant	12.5120	9.68616	42.1533	1.26597
ESG (point)	0.0789376	0.206936	0.0498613	0.0515937***
Size (%)	-0.527683	-0.645612	-3.55078***	-0.0842933
Industry (Dummy)	0.858304	-3.03961	-3.68984	-1.06751***
Age (year)	0.0286102	-0.0664233	0.211297	-0.0204091***
Leverage (time)	-9.03048***	-3.29281	29.8864	-1.40516***
GDP (Billion THB)	-3.45462e-05	6.69348e-05	-0.000604845	1.78718e-05
Inflation (%)	-0.120613	-0.421944	0.798013	-0.0196405
Foreign (%)	0.168561	0.405399	-0.214759	0.0962383***
ESG Score_Foreign (%)	-0.00249759	-0.00569099	0.00296819	-0.00160768**
P-Value	0.000082	0.313817	0.043412	3.31e-11

The result from the Pool OLS multiple regression analysis by total ESG Score above can be shown in the following equations.

Return on Assets (ROA)

From the table, the leverage of the company will negatively impact the company's financial performance in term of ROA that once the company's leverage is increased (i.e. the company has more debt-to-equity) by 1%, ROA will be reduced by 9.03048%.

Return of Equity (ROE)

P-Value is 0.313817 which is higher than

0.01. As a result, no variable will cause the impact on the company's financial performance on ROE.

Return of Sales (ROS)

From the table, the size of the company will negatively impact the company's financial performance in terms of the ROS that if the company's size is larger by 1%, ROS will be reduced by 3.55078%.

Tobin's Q (TBQ)

The table shows significant relationships between various factors and Tobin's Q:
(a) A 1-point increase in ESG Score boosts Tobin's Q by 0.0516.
(b) Manufacturing companies have a 1.0675 lower Tobin's Q compared to non-manufacturing companies.
(c) A 1-year decrease in company age improves Tobin's Q by 0.0204.
(d) A 1% decrease in leverage increases Tobin's Q by 1.4052.
(e) A 1% increase in foreign shareholding raises Tobin's Q by 0.0962.
(f) A 1% decrease in the S Score interacting with foreign shareholding improves Tobin's Q by 0.0016.

Result and analysis based on each Pillar (E, S, G) Scores

From the Pool OLS multiple regression analysis by considering each pillar Score, the relationships between each ESG pillar Score and the financial performance are shown in Table 4 below.

Table 4 Pool OLS multiple regression analysis result from each E, S, and G Score

	ROA	ROE	ROS	TBQ
Constant	11.8178	1.77564	132.673	-0.244638
E Score (point)	-0.102359	-0.0297336	-0.273764	0.00565021
S Score (point)	0.0104869	-0.0162985	-1.63083***	0.0185057
G Score (point)	0.0842930	0.207315	0.217715	0.0324508***
Size (%)	-0.231706	-0.259621	-2.23510*	-0.0464007
Industry (Dummy)	1.90427*	-1.33004	0.624019	-0.861703***
Age (year)	0.0568071	0.00947845	0.366790**	-0.0137385*
Leverage (Time)	-7.72422**	0.502268	26.4532***	-0.920331*
GDP (Billion THB)	5.19885e-05	0.000244497	-0.000462457	3.7811e-05
Inflation (%)	-0.0761637	-0.327276	0.830131	-0.0104680
Foreign (%)	0.189825	0.943479	-4.22904***	0.183088***
E Score_Foreign (%)	0.00146816	-0.000729610	0.00621151	-0.000648040
S Score_Foreign (%)	-0.00342207	-0.0110771	0.0604979***	-0.00172192*
G Score_Foreign (%)	-0.000892849	-0.00234889	-0.00127573	-0.000579490
P-Value	0.000116	0.168532	0.001693	6.79e-12

The result from the Pool OLS multiple regression analysis by each pillar (E, S, G) Score above can be shown as follows: -

Return on Assets (ROA)

From the table, the leverage of the company will impact the company's financial performance in terms of the ROA that once the company's leverage is increased (i.e. the company has more debt-to-equity) by 1%, ROA will be reduced by 7.72422%.

Return on Equity (ROE)

P-Value is 0.168532 which is higher than 0.01. As a result, no variable will cause the impact on the company's financial performance on the ROE.

Return on Sales (ROS)

The table shows how various factors impact a company's ROS as follows:

(a) A 1-point decrease in the S Score improves ROS by 1.63%.
(b) A 1-year increase in the company's age boosts ROS by 0.37%.
(c) A 1% increase in leverage enhances ROS by 26.45%.
(d) A 1% rise in foreign shareholding decreases ROS by 4.23%.
(e) A 1% increase in the S Score interacting with foreign shareholding improves ROS by 0.06%.

Tobin's Q (TBQ)

The table shows how various factors impact a company's Tobin's Q:
(a) A 1-point increase in G Score raises Tobin's Q by 0.032
(b) Manufacturing companies have a 0.86 lower Tobin's Q compared to non-manufacturing companies.
(c) A 1-year decrease in company age improves Tobin's Q by 0.014.
(d) A 1% increase in foreign shareholding boosts Tobin's Q by 0.183.

Limitations of the study

This study has several limitations. Firstly, it only analyzed three years of company annual reports following the Stock Exchange of Thailand's requirement for ESG disclosure. The sample size is small, with only 58 out of 289 companies listed on the SET ESG Index since 2020. The study relied on ESG scores from ESG Book, the rating agency most used by these companies, but only 56 companies had consistent data over the three years, leading to survivorship bias. Additionally, the study focused on four financial performance indicators (ROE, ROA, ROS, and Tobin's Q) and considered control variables such as size, industry, age, and leverage.

Conclusion and implications

This study confirms a significant relationship between ESG scores and financial performance. The total ESG and governance (G) scores positively impact Tobin's Q, indicating better long-term performance, consistent with Clark et al. (2014). However, the social (S) score negatively affects return on sales (ROS), though foreign shareholding improves this outcome. Control variables like industry and age also influence Tobin's Q, with manufacturing firms and older companies showing lower scores, reflecting innovation challenges. These findings highlight the complexity of ESG's influence on financial performance.

The analysis shows that the ESG score, G Score, and foreign shareholding positively impact Tobin's Q (long-term financial performance), while the S Score negatively affects ROS (short-term financial performance). However, combining a higher S Score with increased foreign shareholding improves ROS. This suggests companies should balance long-term and short-term ESG strategies. For long-term gains, focus on the total ESG and G Scores, while for short-term performance, enhance both the S Score and foreign shareholding.
The analysis indicates that the variables studied, including E Score, S Score, G Score, industry, age, leverage, and others, do not have a statistically significant impact on Return on Equity (ROE). This suggests that ROE is influenced by other factors not captured in this model or that the impact of these variables on ROE is not consistent across the companies analyzed. Therefore, these findings highlight the need to explore additional factors that may better explain variations in ROE.

This study explores this relationship and provides actionable insights for stakeholders. Based on the findings, several policy recommendations are offered. Corporate management should integrate ESG into core strategies, particularly focusing on governance to enhance long-term financial performance,

while balancing short-term and long-term goals by aligning social initiatives with foreign investment interests. Investors are advised to prioritize companies with strong ESG practices, particularly in governance, and engage with these companies to ensure alignment with financial goals. Regulators should enforce consistent ESG reporting standards to enhance transparency and comparability and support further research into the sector-specific impacts of ESG practices. These recommendations aim to guide stakeholders in leveraging ESG practices for both financial gains and positive societal impacts.

Future research

Future research could apply a longitudinal method by using more years' data, larger sample size or difference ESG Score as it would increase the reliability of the results. Future research could be expanded to a larger geographical coverage to understand the extent of ESG activities in other countries. Lastly, this study is limited to 4 control variables and 4 finance performance indicators. Future research could include other control variables (e.g. free-float percentage, institutional investors, number of independence director, audit firm size) and employ more financial performance indicators to examine the relationship between ESG and financial performance.

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