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Corporate reputation mediates the effect of environmental, social, and governance (hereinafter ESG) on operating performance: Evidence from Taiwan corporate

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Abstract

This study investigates the influence of environmental, social, and governance (hereinafter ESG) practices on company performance, considering corporate reputation as a mediating factor. Utilising data a decade (2013–2022) from Taiwanese companies featured in the 2022 Dow Jones Index and TEJ, the analysis reveals a significant positive correlation between robust ESG practices and company performance. Integrating ESG strategies into daily operations, coupled with rigorous evaluation and tracking, is beneficial for business performance. This study further examines how major environmental events can influence corporate reputation as an intermediary factor in the ESG context. It specifically examines the external costs from notable incidents, exemplified by the discharge of treated water from Japan's Fukushima Nuclear Power Plant on August 24, 2023. The findings provide actionable insights for companies and governmental agencies, emphasizing the importance of developing and refining ESG strategies and assessments that align with the evolving sustainability challenges and opportunities.

Keywords: *ESG, Operating performance, Panel data, mediation effect*

Data Availability: Publicly available.

JEL Classifications: M14; M41; M42

I .INTRODUCTION

A trend towards sustainability has emerged in Taiwan, with the government, regulations, and companies increasingly focusing on sustainability. The Taiwanese industry is aligning

with global renewable energy development and sustainable corporate practices. The Corporate Governance 3.0-Sustainable Development Blueprint, updated and released by Taiwan's Government Financial Supervisory Commission at the end of 2020, indicates this considerable shift. The mandate required that by 2022, listed companies should disclose, prepare, and submit sustainability reports. This mandate expands to companies with paid-in capital exceeding 2 billion NT dollars, a reduction from the previous 5-billion-NT dollars threshold. The blueprint outlines five core objectives: enhancing board functions and sustainable company value; increasing transparency and promoting sustainable operations; improving stakeholder communication and interaction; aligning with international standards and promoting due diligence; and ensuring a sustainable governance culture with diversified products. These measures aim to enhance environmental, social, and governance (ESG) practices. Corporate governance assessment levels have evolved, initially encompassing three levels in the first session and expanding to five in the second and seven in the third session. Higher corporate governance ratings can lead to a 'value-premium mentality' among investors, potentially increasing investment risks and the cost of equity capital. In response, the Executive established the Task Force on Reforming Corporate Governance in 2003. This task force aimed to enhance corporate governance standards for listed companies and align them with international norms by strengthening board independence and remuneration committees, and by promoting policies such as electronic voting. Initiated in 2013, the

corporate governance evaluations were conducted by the Securities and Futures Institute under the entrustment of the Taiwan Stock Exchange and the Securities Over-the-Counter Trading Center. By 2011, preceding these evaluations, Taiwan Semiconductor Manufacturing Company (TSMC) was already performing exceptionally well, consistently ranking in the top 5% (grade A+), with a paid-in capital of NT$259,320,709,920.[1]

In 2013, TSMC earned the distinction of being an industry leader in the global semiconductor and semiconductor equipment industry groups of the Dow Jones Sustainability Index (DJSI). On its website, TSMC announced its recognition as the Group Leader in its industry, marking a crucial milestone in its journey towards sustainable development and ESG achievement.[2] The DJSI, which encompassed 59 industries divided into 24 groups in 2013, annually evaluates the top 2,500 large companies globally based on market capitalization. It employs sustainable development as a criterion for identifying companies that exhibit outstanding performance. In 2013, the index selected 333 companies, and TSMC was one of the only two semiconductor companies worldwide to be consistently a part of the DJSI for 13 consecutive years. The TSMC's selection as the leader in terms of the sustainable development of the semiconductor industry in 2010 and 2012 and as the leader in its industry group within the DJSI in 2013 indicates its excellence in various domains. These

[1] Please refer to the "Corporate Governance Assessment Area" of the SFI website: http://www.sfi.org.tw/cga/cga1

[2] Publishing unit: Taiwan Semiconductor Manufacturing Co., Ltd., publishing date: 2013/09/18

include supply chain management, environmental policy, management systems, operational environmental benefits, water resource risk management, talent development, labor and human rights, social responsibility reporting, and stakeholder engagement. Dr. Zhang Zhongmou, Chairman, and CEO of TSMC commented on this achievement: ‘I believe that TSMC's continued commitment to sustainable development not only demonstrates our company’s social responsibility but also forms an integral part of our overall development. In the areas of economy, environment, and society, TSMC’s sustainable actions have established stronger trust between TSMC and its customers, improved employee satisfaction, and positively affected the social and natural environment, all aimed at creating more value for our shareholders. Being recognized as a leader in the semiconductor and semiconductor equipment industry acknowledges TSMC’s investment in pursuing sustainable development and further encourages us to work harder to make the world a better place.

The TSMC has solidified its position in the global arena for over a decade since the pivotal developments of 2013. This status is the outcome of sustained commitment to ESG practices, illustrating that the company’s ranking is not by chance. Evidently, ESG provides long-term and considerable value for operating performance, and its far-reaching influence on corporate reputation is remarkable, warranting further research. In 2023, an additional factor that profoundly affects corporate reputation is external cost transfer and the associated reputational damage caused by the discharge of treated nuclear water from Japan's Fukushima

Nuclear Plant on August 24, 2023. This indicates the considerable influence of the intermediary role of corporate reputation in this context, necessitating further research.

This study adopts a three-pronged research approach. First, it compiled panel data on Taiwanese companies included in the DJSI World Index and DJSI Emerging Markets. Then, through a regression analysis, this study investigated whether ESG practices significantly influence business performance and reputation. Finally, based on the results of the empirical analysis, this study proposes recommendations for companies and government regulatory agencies to formulate ESG development strategies or assessments. This study addressed the phenomenon of delayed information response and thoroughly evaluated regulatory authorities' efforts to motivate domestic companies to improve their ESG practices and enhance capital market quality. By establishing regulations and professional codes for internal ESG practice structures and publishing information on ESG implementation status and effectiveness, this study seeks to eliminate the information asymmetry between company management and investors. This approach mitigates the delayed reaction hypothesis outlined by Chan et al. (1996).

Table 2, Panel A highlights the significance of paid-in capital for the companies analyzed, with an average value of approximately NT$87.3 billion. The values range from approximately NT$4.24 billion to NT$259 billion. The governance evaluation results for the sample companies are notable because most companies are ranked in the top 20% annually,

with the majority receiving a grade of A or higher. Furthermore, their CPA visa firms rank among the top four in Taiwan, although these data are not listed.

This study makes two main contributions to the literature. First, it directly uses Taiwanese companies listed on the 2022 DJSI as its sample. These companies were assessed using Taiwan's latest Corporate Governance Evaluation System, which is relevant to Taiwan, and they exhibit outstanding results, thus providing precise and relevant evidence for this research. Second, the empirical findings of this study are valuable for regulatory bodies evaluating the implementation of ESG policies and for investors analyzing decision-making processes.

The empirical results of this study have implications for managerial action. First, company management should consider ESG a fundamental aspect of sustainable operations. Second, ESG performance is a crucial factor for investors evaluating potential investment targets. Third, regulatory authorities should recognize that comprehensive attention to ESG practices across all levels of a company is essential for enhancing overall ESG quality.

Ⅱ. LITERATURE DISCUSSION AND REVIEW

2.1 ESG definition and measurement

The evolution of the concept of corporate social responsibility has culminated in the establishment of sustainable development goals and ESG criteria by the United Nations in 2015, which offer clear norms and indicators. The 2004 Who Cares Wins report by the United

Nations Global Compact advocates the integration of these three ESG aspects into company evaluations of their investment decisions and operating performance. According to the S&P Global ESG indicators, ESG can be divided into three major dimensions.

1. Environmental protection (E, environment):

This dimension focuses on the prevention and control of environmental pollution and includes elements such as climate change, carbon emissions, water usage, pollution, biodiversity, land use, waste management, recycling, sustainable forestry management, building materials, climate tactics, operational eco-efficiency, and packaging.

2. Social responsibility (S, social):

This dimension includes labor standards, customer benefits, labor relations, stakeholders' effects, and consequences of diversification and co-financing decisions. It encompasses a broad spectrum of areas, such as labor standards, workplace diversity, worker health and safety, community effects, religious conflicts, cost burdens of resolution, human rights, social reporting, talent attraction and retention, strategies to improve access to drugs or products, and financial inclusion.

3. Corporate governance (G, governance):

This dimension is related to a company's stability and reputation, and includes risk management, information transparency, business ethics, competitive behavior, and supply chain management. The key areas of focus are board diversity and structure, director

responsibilities, executive compensation, risk management, political contributions and lobbying, tax strategy, bribery and corruption, sustainable finance, the code of business conduct, brand management, financial stability, innovation management, and customer privacy.

This study explored the influence of the three aggregated aspects of ESG, as an indicator of sustainable management, on company and business performance. The rationale for selecting Taiwanese companies listed on the Dow Jones Index as a sample is as follows.

First, the DJSI was inaugurated in September 1999 and co-hosted by the US S&P Dow Jones Indices and the Swiss Sustainability Group (RobecoSAM). The DJSI, an extension of the US Dow Jones Industrial Average Index, serves as a socially responsible investment index. It is the first of its type globally and is one of the most credible tools for evaluating corporate sustainability. The DJSI aims to encourage more companies to undertake social responsibilities, and has become a crucial reference for global investment institutions[3]. The DJSI invites >3,500 companies worldwide to participate in its annual evaluations, and corporate sustainability assessments are implemented to evaluate organizations based on the triple aspects of corporate economy, society, and environment; therefore, the index functions as a comprehensive ESG rating agency.

Second, relevant studies have often relied on national foresight or Tianxia Corporate

[3] Detailed 2013-2022 Dow Jones Sustainability Index selection results: http://www.sustainability-indices.com/images/130912-djsi-review-2013-en-vdef_tcm1071-372482.pdf, etc.

Social Responsibility awards for sample selection.

However, this study selected Taiwan-listed companies in the 2022 DJSI, an international evaluation organization. The rationale for this choice is that the selected companies demonstrate a comprehensive understanding and implementation of ESG principles. Furthermore, their considerable influence in Taiwan and exemplary performance in corporate governance evaluations render them relevant to this study.

2.2 ESG and company reputation

In 2021, the European Commission defined ESG as 'the concept by which companies integrate social and environmental issues into their business operations and voluntary interactions with stakeholders' (European Commission, 2001, p. 8). Carroll (1979) divides social obligations into four categories: legal, economic, philanthropic, and moral. ESG activities denote an organization's commitment to demonstrating responsible behavior and its efforts and actions implemented to respond to certain external factors. Corporate reputation as 'the overall impression that reflects the perceptions of a collective stakeholder group. ' Zhu et al. (2014) posited that satisfying the interests of all stakeholders enhances a company's reputation. Rindova et al. (2005) view corporate reputation as a reflection of a company's capability to deliver quality goods and services. They suggested that a company's reputation improves when it acts in the best interests of its stakeholders and performs activities that

benefit society.

Through participation in ESG activities, a company can enhance its reputation (Brammer & Pavelin, 2006; Fombrun & Shanley, 1990; Luo & Bhattacharya, 2006). In addition, analytical reviews have revealed a correlation between ESG initiatives and corporate outcomes, and have demonstrated that a company's reputation and goodwill are positively influenced by its ESG activities (Aguinis & Glavas, 2012; Brammer & Pavelin, 2006; Orlitzky et al., 2003). Socially responsible behavior can improve a company's reputation and increase consumer trust. From an employee perspective, ESG participation can enhance employee pride and commitment to the organization (Lee, Park, & Lee, 2013) and positively affect a company's reputation rating (Stawiski et al., 2010). In addition, in buyer–supplier relationships, a supplier's reputation can be affected by the buyer's perception of the supplier's participation in ESG activities (Park, Lee, & Kim, 2014). These findings suggest a strong relationship between ESG activities and enhancement of corporate reputation. Corporate reputation reflects the collective subjective evaluation of all stakeholder groups over time. ESG is crucial for ensuring a favorable corporate reputation because it is a key strategic resource and corporate reputation can serve as a competitive advantage. Therefore, we propose the following hypothesis:

H_1: Company reputation is positively affected by ESG activities.

2.3 ESG and company operating performance

The interactions between ESG initiatives and a company's operating performance are complex. Regulations motivate companies to engage in ESG practices; however, companies incur substantial costs when investing in ESG, which is contrary to their objective of maximizing profits. This raises the question of why companies choose to engage in ESG activities despite their potential decline in operating performance and increased costs. Although the popularity of ESG has surged, research on the relationship between ESG engagement and operating performance remains limited (Kechiche & Soparnot, 2012; Hao and Luc, 2017). Inoue and Lee (2011) analyzed the influence of ESG practices on company operating performance, indicating the significance of analyzing the economic benefits of ESG practices and the underlying mechanisms.

Contemporary literature often encapsulates the rationale of ESG participation with the phrase "doing well by doing good," implying that ESG activities enhance company profitability and value creation (Karl V., Henri, & Ane, 2017).

Studies have examined whether companies can engage in ESG activities cost-effectively and have aimed to understand the effect of such participation on company operating performance (Borisov, Goldman, & Gupta, 2016; Naseem et al., 2020). According to stakeholder theory, a company's business performance improves because of ESG engagement (Deng et al., 2013; Magill, Quinzii & Rochet, 2015; Singal, 2014;

Tsoutsoura, 2004). Companies with higher social performance can interact more favorably with stakeholders than those with lower social performance, thereby gaining competitive advantage and improving their performance (Saeidi et al., 2015).

The participation of a company in ESG activities positively affects stakeholders' attitudes in the short term and increases advocacy behaviors in the long term (Du, Bhattacharya, & Sen, 2010). Sen and Bhattacharya (2001) state that consumers generally prefer purchasing from socially responsible companies, which positively affects their performance. Encouraging suppliers to comply with ESG standards and participate in ESG activities can improve performance and brand image (Mishra & Suar, 2010). Jia (2020) found that companies with increased ESG engagement in highly competitive industries exhibit more substantial improvements than those in less competitive sectors.

Taken together, these results suggest that ESG activities positively affect profitability. Participation in ESG activities creates a favorable organizational image among customers and stakeholders, fostering a loyal customer base. Based on these insights, the following hypothesis is formulated:

H_2: Company operating performance is positively affected by ESG activities.

2.4 Mediating role of company reputation in the relationship between ESG and company operating performance

This study posits that corporate reputation mediates the relationship between ESG engagement and operating performance. Fombrun (2005) suggested that participation in ESG activities can improve a company's reputation. From a resource-based perspective, company reputation is a valuable asset that can significantly affect consumer loyalty (Cabral, 2012; Davies et al., 2003), positively affect the willingness of stakeholders to exchange resources (Pfarrer, Pollock, & Rindova, 2010), and create future profitability opportunities for the company (Roberts & Dowling, 2002). A company can improve its reputation through ESG initiatives that meet stakeholders' expectations of stakeholders (Jones, 2005), including employees, customers, and investors, which in turn leads to improved operating performance. Additionally, improving a company's reputation through ESG participation can create indirect economic benefits, including new market opportunities (Fombrun, Gardberg, & Barnett, 2000). Company reputation also positively influences the relationship between ESG and operating performance because ESG participation can significantly improve company reputation, as well as create positive perceptions and enhance goodwill among stakeholders towards the company, thereby positively affecting profitability.

These efforts aim to estimate the total annual environmental costs of industry and the burden of environmental pollution on the public (termed external costs, because they are not borne by polluting companies but by the public). However, a key challenge in environmental management accounting is the lack of a standardized definition of environmental costs.

Depending on the perspective, these costs include various expenses such as disposal, investment, and sometimes external costs (i.e., costs incurred externally, mainly by the public). The benefits of a company's environmental activities (e.g., saving on environmental costs) are also considered. Most costs are often not systematically traced and attributed to responsible processes and products but are aggregated under general selling and administrative expenses. With this lack of detailed recording, determining improvement options is often challenging. Environmental projects that aim to prevent emissions and waste at the source through superior raw material use and reduced utilization of hazardous materials are often not recognized or implemented as avoidance options. Even when avoidance options were not considered, the ecological benefits derived from such measurements were considerable.

This study highlights the higher costs of waste generation and emissions than processing costs. These higher costs have implications for corporate reputation and, by extension, the relationship between ESG activities and operating performance. An example relevant to this study is the decision made by the Japanese government regarding the discharge of treated nuclear water from the Fukushima Nuclear Plant, its subsequent effect on corporate reputation, and the assessment of environmental costs. The external costs and the resultant negative effects of this event on corporate reputation are substantial, highlighting how arbitrary allocation can profoundly affect the intermediary role of corporate reputation. In a

related development, the California Assembly passed the nation's first mandatory climate disclosure bill in September of the same year[4], which mandates transparency in reporting the three categories of greenhouse gas emissions. Therefore, we propose the following hypotheses:

H_3: Corporate reputation mediates the relationship between ESG activities and company operating performance.

III. RESEACH METHODS

This study explored the relationship between operating performance and ESG practices. The research methodology is divided into three parts: selection of research samples and data sources, definition of research variables, and model setting and estimation.

3.1 Research sample selection and data sources

To explore the interplay between company operating performance and ESG practices, this study used Taiwanese companies listed in the 2022 DJSI as its sample. A decade of historical data spanning from 2013 to 2022 were analyzed through regression analysis.

3.1.1 Data sources and research sample selection

3.1.1.1 Data sources

[4] The law, whose full name is the Corporate Climate Data Responsibility Act (referred to as SB 253), forces large U.S. companies with annual revenue of US$1 billion and operations in California to publicly disclose their greenhouse gas emissions in "all categories."

The primary data source for this study was the DJSI, which was established in 1999 through collaboration between the S&P Dow Jones Indices and RobecoSAM. This study initially considered 33 Taiwanese companies. However, because of the delisting of ASE Semiconductor Corporation, the final sample included 32 companies. Although initially included, ASE Semiconductor Corporation was delisted on April 30, 2018, with the listing category being the Semiconductor Industry. The company's delisting potentially compromised the reliability of the analysis and evaluation, necessitating its removal from this study.

3.1.1.2 Research sample

The study subjects were 33 listed Taiwanese companies selected from the 2022 DJSI. The data collection period spanned 10 years from 2013 to 2022. The sample companies in various industries selection is shown in Table 1.

Table 1. Sample companies in various industries

	公司	Industry Group
1	CTBC Financial Holding Co., Ltd. (2891)	Banking
2	E.SUN Financial Holding Co., Ltd. (2884)	
3	First Financial Holding Co., Ltd. (2892)	
4	Mega Financial Holding Co., Ltd. (2886)	
5	SinoPac Financial Holdings Co., Ltd. (2890)	
6	Taishin Financial Holding Co., Ltd. (2887)	
7	CTCI Co., Ltd. (9933)	Principal goods
8	TECO ELECTRIC AND MACHINERY	

	Co., Ltd.(1504)	
9	Chailease Finance Co., Ltd. (5871)	Integrated Services
10	Yuanta Financial Holding Co., Ltd. (2885)	
11	President Chain Store Co., Ltd. (2912)	Food & Daily Retail
12	Cathay Financial Holdings Co., Ltd. (2882)	Insurance
13	China Development Financial Holding Co., Ltd.(2883)	
14	Fubon Financial Holding Co., Ltd. (2881)	
15	Shin Kong Financial Holding Co., Ltd. (2888)	
16	China Steel Co., Ltd. (2002)	Raw Materials
17	ASE Technology Holding Co., Ltd. (3711)	Semiconductors & Equipment
18	Nanya Technology Co., Ltd. (2408)	
19	Taiwan Semiconductor Manufacturing Co., Ltd. (2330)	
20	United Microelectronics Co., Ltd. (2303)	
21	Vanguard International Semiconductor Co., Ltd. (5347)	
22	WIN SEMICONDUCTORS Co., Ltd. (3105)	
23	Acer Incorporated Co., Ltd. (2353)	Electronics, Equipment & Components
24	AUO Corporation Co., Ltd. (2409)	
25	Delta Electronics, Inc. Ltd. (2308)	
26	E Ink Holdings Incorporated Co., Ltd. (8069)	
27	Innolux Co., Ltd. (3481)	
28	LITE-ON TECHNOLOGY Co., Ltd. (2301)	
29	WISTRON Co., Ltd. (3231)	
30	Chunghwa Telecom Co., Ltd. (2412)	Communications services
31	Far EasTone Telecommunications Co., Ltd.(4904)	
32	Taiwan Mobile Co., Ltd. (3045)	
33	China Airlines Co., Ltd. (2610)	Transportation

Data source: Compiled from DJSI 2022 press release

3.2 Variable measurement

3.2.1 ESG

This study measured ESG based on the inclusion of Taiwanese companies in the DJSI from 2013 to 2022. A total of 32 companies were analyzed. Each company that won the DJSI award between 2013 and 2022 was awarded one point per year of inclusion. A company that included 10 consecutive years scored 10 points. Consequently, the ESG score for each company ranged from 1 to 10 points depending on the number of years for which they have been included in the index.

3.2.2 Company reputation

This study employed a dummy variable method to evaluate the reputation of 32 listed Taiwanese companies in the DJSI for 2022. Each company selected for the index from 2013 to 2022 received one point for each year of selection; those not selected were assigned a score of 0.

3.2.3 Dependent variables

It is unclear whether investing in ESG involves companies incurring costs and increased expenditures. Previous empirical results reveal that ESG positively affects a company's

financial performance, nonfinancial performance, and research and development (R&D) expenditure (Li Xiuying, 2011).

ESG requires a strategic long-term investment approach. This study employed Tobin's Q, which was used by Graves and Waddock (1997) and Kim et al. (2015) and is defined as the ratio of a company's market value to the sum of its debt and the book value of its total assets. This reflects a company's growth potential and expected standards for future profitability.

Return on assets (ROA) is used to represent company profitability and competitive viability. Profitability is determined using metrics, such as ROA, return on shareholder equity, net profit margin, and earnings per share, with higher values indicating greater profitability. ROA was selected as the explanatory variable to measure a company's operating performance. Chunying (2008) posits that a company's asset quality is positively related to its operating performance. The choice of ROA as a performance measurement variable was also informed by the findings of Chi et al. (2014) that engagement in ESG activities can increase ROA in the year involved because of the price premium advantage of ESG. This effect on ROA often extends to subsequent years.

ROA (before tax, interest and depreciation) = (net profit after tax + interest expense x (1 - tax rate) + depreciation x (1 - tax rate) + income tax) / total assets = (net profit before

tax + interest expense + depreciation) /total assets

3.2.4 Control variables

In all the regression analyses in this study, a wide range of control variables was incorporated to capture the nuances of a company's engagement in ESG activities and its subsequent effects on performance and reputation. These control variables include negative reputation, reflecting the influence of adverse public perception and R&D investment, indicating the company's commitment to innovation. Financial health and shareholder value distributions were determined based on assets and dividend payouts, and economic expansion and investment levels were indicated by revenue growth and paid-in capital. Company size and workforce investment were represented by the number of employees. Similarly, financial structure and operational efficiency were evaluated using financial and operational leverage. Fixed asset turnover times provide insights into asset utilization efficiency in revenue generation. Liquidity and financial stability were analyzed using ratios such as interest coverage and quick and current ratios. The company's overall financial health and performance were assessed based on the total asset return growth rate and total asset growth rate. Furthermore, these variables not only served as analytical tools in this study, but are also recognized in the literature as factors that can motivate companies to engage in various ESG activities (McWilliams & Siegel, 2018). This study controls for the presence of "sin"

industries in tests related to corporate risk. “Sin” industries typically engage in activities considered morally questionable, harmful to health, or detrimental to society, including industries elated to tobacco or alcohol. These industries are less attractive to socially responsible investors because of the social norm effect, which leads to increased investment risk.

Although the study acknowledges the broader context of environmental cost accounting, it focuses on the corporate reputation aspect and its relation to ESG rather than delving deeply into the specifics of environmental cost management. Environmental projects aimed at preventing emissions and waste through better resource utilization or avoidance options may not be fully recognized or implemented. Even when not used, these avoidance strategies offer ecological benefits that are often greater than the costs of waste and emissions management. A pertinent example is the decision of the Japanese government to permit the discharge of treated water from the Fukushima Nuclear Plant on August 24, 2023. The external costs and associated effects of such events on company reputation underscore the importance of considering these factors when analyzing the influence of external events on corporate reputation.

In financial terms, controlling for factors such as financial leverage can capture the implications of relaxed resource assumptions in which a company’s social performance may be influenced by its prior financial performance. In this study, sales growth is included as a control variable to account for company growth opportunities. In addition, a dummy variable

for "sin" industries is incorporated to account for the influence of negative ESG news on company operating performance. This variable takes a value of 1 for companies from “sin” industries and 0 otherwise. Hill (2001) posits that ESG activities in these industries might be perceived as unethical or unsustainable, potentially alienating these companies from society, damaging their reputation, increasing costs, weakening their operational licenses, and ultimately affecting shareholder value.

Controlling for firm size is crucial, because it significantly affects a firm's capability to engage in social activities. Larger companies often have more resources and higher public visibility, leading to expectations of greater ESG engagement compared to expectations from smaller companies (Crisostomo, de Souza Freire, & de Vasconcellos, 2011).

Additionally, controlling for R&D expenses is crucial in examining a company’s engagement in ESG. An increase in R&D expenses can indicate or reflect commitment to ESG activities. Similarly, a company’s dividend policy, manifested in its payout ratio, is also an influential factor. A high payout ratio might imply that few resources are available for ESG activities, affecting the level of engagement in these practices. Variable measurements and definitions are provided in the **Appendix.**

The effects of ESG on company operating performance can be examined from two perspectives:

First, ESG positively influences operating performance. This perspective is supported by

the benefits gained when companies engage in ESG activities, such as increased revenue and enhanced resilience to negative events. This observation suggests that ESG activities not only fulfil ethical and social responsibilities, but also contribute to financial success.

The second counterperspective posits that ESG negatively affects operating performance. This perspective is based on the understanding that ESG engagement incurs additional expenses and increases agency costs because of information asymmetry between management and shareholders. Therefore, ESG and a company's operating performance have an inverse relationship.

The concept of ESG has become increasingly ingrained in societal and corporate consciousness, leading to greater investments in ESG activities. Management must not only navigate environmental and social moral pressures but also consider the implications of ESG for a company's operating performance and shareholder wealth. Therefore, a greater emphasis should be placed on understanding the benefits and drawbacks of ESG engagement.

Xiangxuan et al. (2014) discovered that during negative events, such as profits falling below expectations, companies engaged in ESG experienced less severe short-term declines in stock prices than those not engaged in ESG. This observation indicates that companies that do not participate in ESG activities tend to experience more significant stock price reductions in such scenarios. However, in the long term, this effect appears neutral. This suggests that the hypothesis of a win-win situation for reputation and financial gain is valid. ESG demonstrates

a positive relationship with market performance and its reputation effect can offer timely protection for the stock prices of companies engaged in ESG activities. Additionally, ESG can offset company agency costs. Even with high agency costs, engaging in ESG can stabilize investor confidence and contribute to market value.

Engaging in ESG activities, although beneficial in many respects, involves additional operating, sales, and management expenses. However, these costs do not significantly affect the short-term operating performance. For companies with high agency costs, engaging in ESG can improve short-term operating performance primarily because of the reputational benefits accrued. However, in the long term, these companies may exhibit poorer operating performance owing to inefficient resource allocation, and these issues may be amplified by agency problems. The influence of ESG on a company can be explained by the dual nature of water: it can support and capsize a boat. Effectively strategized ESG engagement can yield increased rewards and reduced risks, particularly through the enhancement of corporate reputation. However, if a company struggles to sustain the costs and expenses associated with its ESG activities, its operating performance and profitability may decline. Therefore, managers should carefully consider the implications of applying ESG strategies. In the context of this study, operating performance was measured using ROA and return on net worth. The empirical results indicate a significant negative correlation between the overdisbursement ratio and performance. These results suggest that higher spending does not necessarily translate to

superior performance and that such spending may even hinder it. The findings also indicate that larger companies tend to exhibit superior operating performance, likely because of their greater resources and capacity to absorb the costs associated with ESG activities. Interestingly, the capital adequacy ratio does not have a significant effect on operating performance, indicating that other factors might play a more decisive role in determining the success of ESG engagements.

IV EMPIRICAL ANALYSIS

Table 2, Panel A reports the descriptive statistics for all variables from models (1) to (5) based on the sample of 320 firm-year observations. This study focused on Taiwanese companies listed in the 2022 DJSI; 33 companies from the 2013 to 2022 analysis period were excluded from 1 company. After excluding those with missing data, 32 companies were included in the annual sample. Table 2, Panel B presents the correlation matrix for the samples. The study analysed a comprehensive set of variables, including main and control variables: ROA (tax before interest and depreciation), Tobin's Q, ESG score, company reputation dummy, negative reputation score, R&D rate, asset size, dividend payout rate, revenue growth rate, paid-in capital amount, number of employees, financial leverage, operating leverage, fixed asset turnover times, interest coverage ratio, quick ratio, current ratio, total asset return growth rate, and total asset growth rate.

4.1. ESG/company reputation

First, following the methodologies of Liu and Lu (2021), Wooldridge and Jeffrey (2020), and Baron and Kenny (1986), this study examines the influence of ESG on company reputation. Hypothesis 1 was tested using the following logit regression model, the results of which supported the idea that corporate reputation is positively affected by ESG activities:

$$Reputation\ Dum_{i,t} = \alpha + \beta_1 ESG_{i,t-1} + Control_{i,t-1} + Industry\ FE + Year\ FE + \mu \quad ...(1)$$

In this model, $Reputation\ Dum_{i,t}$ takes a value of 1 per year if company i, which is selected as a DJSI Taiwan company in 2022, has been a winner from 2013 to 2022; otherwise, it is 0; a maximum of 10 points can be accumulated. The variable $ESG_{i,t-1}$ represents the ESG score of company i at time $t-1$ and is calculated based on its selection in the DJSI over the years. A company selected for 10 consecutive years received a score of 10.

The control variables in the model are negative reputation score, R&D rate, asset size, dividend payout rate, revenue growth rate, paid-in capital amount, number of employees, financial leverage, operating leverage, fixed asset turnover times, interest coverage ratio, quick ratio, current ratio, total asset return growth rate, and total asset growth rate.

In addition, to control for unobservable year- and industry-related heterogeneity, year- and industry-fixed effects are included in the model.

Firm-level standard errors were used for statistical analysis. The value of the ESG coefficient in this model reflects the influence of a company's ESG activities on its reputation, independent of company characteristics, year, or industry fixed effects.

$$Reputation\ Score_{i,t} = \alpha + \beta_1 ESG_{i,t-1} + Control_{i,t-1} + Industry\ FE + Year\ FE + \mu \quad ...(2)$$

This study also explored the influence of ESG on company reputation, accounting for the occurrence of negative ESG-related events derived from internet searches. The value of $Reputation\ Score_{i,t}$ is set to 1 for the *i*-th company that appears in the search results for negative ESG news at time *t*; otherwise, the value is 0. As in previous models, the control variables include the negative reputation score, R&D rate, asset size, dividend payout rate, revenue growth rate, paid-in capital amount, number of employees, financial leverage, operating leverage, fixed asset turnover times, interest coverage ratio, quick ratio, current ratio, total asset return growth rate, and total asset growth rate. The results of Models 1 and 2, presented in Table 3, support Hypothesis 1, indicating that corporate reputation is positively affected by ESG activities. Notably, Model 1 exhibited a better fit than Model 2 did.

In Model 1, several control variables had a positive influence on company reputation. These include the R&D rate, asset size, dividend payout rate, paid-in capital amount, number of employees, financial leverage, operating leverage, fixed asset turnover times, interest coverage ratio, current ratio, total asset return growth rate, and total asset growth rate. Among

these variables, the interest coverage ratio had a significant positive influence on company reputation. An increase in company size (including paid-in capital) and ROA typically enhances a company's financial status; thus, more financial resources can be allocated for ESG activities, thereby improving company reputation. Conversely, Model 2 revealed that the R&D expense ratio, asset scale, dividend payout rate, revenue growth rate, financial leverage, fixed asset turnover, and quick ratio negatively affect company reputation.

4.2 Influence of ESG on company operating performance and the mediating role of company reputation

Stakeholder theory posits that robust social performance can create shareholder value through superior financial performance. Following the methodologies of Liu and Lu (2021), Wooldridge and Jeffrey (2020), and Baron and Kenny (1986), the influence of ESG activities on operating performance was estimated using the following equation:

$$FP_{i,t} = \alpha + \beta_1 ESG_{i,t-1} + Control_{i,t-1} + Industry\ FE + Year\ FE + \mu \quad \ldots(3)$$

ROA and Tobin's Q are used to measure a company's operating performance (*FP*), $ESG_{i,t-1}$ represents the ESG score of company *i* from the ESG database at time $t-1$. The control variables were similar to those in Model 1. The coefficient of ESG reflects the extent of its influence on a company's operating performance. According to Table 4, ESG activities have a strong positive influence on operating performance.

Furthermore, according to the hypothesis, a company's reputation partly accounts for the positive effect of ESG initiatives on ROA and Tobin's Q. To analyze the mediating role of corporate reputation in the relationship between ESG activities and corporate operating performance, regression equations from Models 3 and 4 were used. The results, as illustrated in Table 4, support Hypothesis 2, indicating that corporate operating performance is positively affected by ESG activities, and Hypothesis 3, asserting that corporate reputation mediates the relationship between ESG activities and operating performance. The equation for Model 4 is as follows.

$$FP_{i,t} = \alpha + \beta_1 ESG_{i,t-1} + \beta_2 Reputation\ Dum_{i,t-1} + Control_{i,t-1} + Industry\ FE + Year\ FE + \mu \quad ...(4)$$

In this model, if a Taiwanese company selected in the DJSI in 2022 is included in the index at time *t*, the reputation dummy variable *i* for that company is set to one; otherwise, it is set to zero. The mediating role of corporate reputation is assessed by comparing the ESG coefficients in Models 3 and 4 in Table 4. Specifically, the changes in ESG values in Model 4 compared with those in Model 3 illustrate the extent to which corporate reputation mediates the relationship between ESG activities and corporate operating performance.

Table 4 provides a detailed description of the influence of ESG on operating performance, and the mediating role of company reputation in the relationship between ESG and operating performance. ROA and Tobin's Q were used to measure financial performance.

In Model 3, the range of the control variables exhibited a significant influence. The dividend payout rate, paid-in capital, number of employees, financial leverage, interest coverage ratio, quick ratio, total asset return growth rate, and total asset growth rate positively affect ROA and Tobin's Q. However, only a portion of the dividend payout ratio and financial leverage are not significantly related to ROA and Tobin's Q. Conversely, variables such as negative reputation score, R&D rate, asset size, revenue growth rate, financial leverage, operating leverage, fixed asset turnover times, and current ratio negatively influence operating performance, and asset size, operating leverage, fixed asset turnover, and current ratio have a significantly negative effect. An increase in company size, as indicated by paid-incapital, can lead to increased profitability. An increase in financial leverage expands a company's financial resources but also increases its financial costs and risks, which can adversely affect profitability.

In Model 4, trends similar to those in Model 3 were observed. A negative reputation score, dividend payout rate, paid-in capital, number of employees, financial leverage, interest coverage ratio, quick ratio, total asset return growth rate, and total asset growth rate positively influenced ROA and Tobin's Q. Moreover, some variables such as a negative reputation score, dividend payout ratio, and financial leverage did not have a significant influence on ROA and Tobin's Q, whereas others negatively affected company performance. Notably, negative reputation scores, R&D rates, revenue growth rates, and current ratios have

a significant negative effect. Expansion of company size (reflected by paid-in capital) does not necessarily improve profitability. On the other hand, increased financial leverage, despite expanding a company's financial resources, can increase its financial costs or risks, potentially reducing profitability.

The findings suggest that small companies can increase their visibility and brand image by implementing ESG, thereby strengthening their operating performance. For large companies, ESG implementation can capitalize on their existing social recognition, increasing their reputation, and further enhancing operating performance. This enhancement in consumer confidence can positively affect the operating performance. However, similar benefits may not occur for medium-sized companies, whose total assets exceed certain thresholds. Despite increased investment in ESG, these companies may not exhibit improved operating performance due to insufficient social awareness. Excessive investment in ESG may erode existing operational profits, potentially leading to a decrease, rather than an increase, in operating performance.

4-3. Additional empirical analysis

Model 5 examines the combined influence of ESG activities and company reputation on financial performance metrics. The model was designed to capture the interplay between these factors and their collective influence on financial performance metrics, such as ROA

and Tobin's Q, through the following equation:

$$FP_{i,t} = \alpha + \beta_1 ESG_{i,t-1} + \beta_2 Reputation\ Dum_{i,t-1} + \beta_3 ESG_{i,t-1} * Reputation\ Dum_{i,t-1} + Control_{i,t-1} + Industry\ FE + Year\ FE + \mu \quad ...(5)$$

As illustrated in Table 5, when company reputation is considered a mediating factor, the influence of ESG on ROA and Tobin's Q is non-significant, as indicated by the *p* values. This result does not support Hypothesis 3, suggesting that corporate reputation partially mediates the relationship between ESG activities and operating performance.

The additional analysis also focuses on the transfer of external costs related to negative ESG events and the arbitrary allocation of costs associated with a negative corporate reputation. A relevant example is the external cost implications following the decision to discharge treated nuclear water from the Fukushima Nuclear Power Plant in Japan, starting on August 24, 2023. The empirical results provide recommendations for companies and governmental organizations to formulate strategies or assessments related to ESG development.

An example is the ASE Semiconductor K7 Factory incident of December 9, 2013. The Environmental Protection Bureau of the Kaohsiung City Government fined NT$600,000 for wastewater pollution in the Houjin Creek. Despite this negative ESG event, the company was recognized in the DJSI in 2022, achieving the highest score in the Semiconductor and Semiconductor Equipment Industry category. It became the first company in this industry globally, the first in all industries in Taiwan to obtain the highest score for seven consecutive years, and the first in Taiwan to receive the highest score for six consecutive years. This achievement in carbon disclosure and other areas demonstrates that corporate reputation can serve as an intermediary factor in the ESG context.

Table 2. Descriptive statistics and Correlation matrix (320 obs)

Panel A. Descriptive statistics

Variables	Obs.	Mean	Std. dev.	Min	Max
ROA before taxes, interest, depreciation	320	10.04	9.504	-3.94	38.91
Tobin's Q	320	0.94	0.96	0.04	5.1
ESGSCORE	320	2.64	2.96	0	10
Reputation dum	320	0.60	0.49	0	1
Negative reputation score	320	0.34	0.48	0	1
R&D rates	320	0.01	0.02	0	0.08
Asset size	320	8.72	0.69	7.32	10.08
Dividend payout ratio	320	60.35	40.80	0	532.86
Revenue growth rate	320	5.80	22.94	-53.39	214.86
Paid-in capital	320	8.73e+10	6.82e+10	4.24e+09	2.59e+11
Number of employees	320	21835.07	21453.32	0	93840
Financial leverage	320	0.96	1.06	-14	5.04
Operating leverage	320	4.12	5.58	-2.71	41.13
Fixed asset turnover times	320	4.32	11.21	0	80.54
Interest coverage ratio	320	109.56	52.75	-27.64	7240.61
Quick ratio	320	84.04	102.70	0	695.98
Current ratio	320	111.90	124.30	0	874.22
Total asset return growth rate	320	0.82	4.43	-20.42	34.83
Total assets growth rate	320	7.80	14.99	-51.83	168.16

Panel B. Pearson Correlation matrix

	ROAbef~r	TobinsQ	ESGSCORE	Reputa~m	Negati~e	RDrates	Assets~e
ROAbeforet~r	1.0000						
TobinsQ	0.8530 0.0000	1.0000					
ESGSCORE	0.1685 0.3396	0.1115 1.0000	1.0000				
Reputation~m	0.1379 1.0000	0.0575 1.0000	0.7163 0.0000	1.0000			
Negativere~e	0.0595 1.0000	-0.0117 1.0000	0.3307 0.0000	0.2778 0.0001	1.0000		
RDrates	0.4693 0.0000	0.3792 0.0000	0.1203 1.0000	0.0388 1.0000	-0.1284 1.0000	1.0000	
Assetsize	-0.5334 0.0000	-0.5280 0.0000	0.1091 1.0000	0.1378 1.0000	0.1448 1.0000	-0.4391 0.0000	1.0000
Dividendpa~o	0.1508 0.9364	0.2421 0.0016	0.1244 1.0000	0.0598 1.0000	0.0554 1.0000	0.0565 1.0000	-0.2181 0.0114
Revenuegro~e	0.1051 1.0000	0.0886 1.0000	-0.0998 1.0000	-0.1466 1.0000	-0.0399 1.0000	-0.0102 1.0000	0.0356 1.0000
Paidincapi~l	-0.2533 0.0006	-0.3098 0.0000	0.1236 1.0000	0.1240 1.0000	0.1706 0.2993	-0.3051 0.0000	0.8503 0.0000
Numberofem~s	0.0886 1.0000	-0.0383 1.0000	0.1376 1.0000	0.1624 0.4874	0.1427 1.0000	0.2840 0.0000	0.2199 0.0099
Fixedasset~s	-0.0739 1.0000	-0.0372 1.0000	0.0976 1.0000	0.0635 1.0000	-0.1010 1.0000	0.1413 1.0000	-0.2562 0.0005
Interestco~o	0.2328 0.0035	0.1418 1.0000	0.0105 1.0000	0.1135 1.0000	0.0996 1.0000	0.0623 1.0000	-0.0890 1.0000
Quickratio	0.6045 0.0000	0.5023 0.0000	0.0245 1.0000	-0.0045 1.0000	-0.0552 1.0000	0.5980 0.0000	-0.5695 0.0000
Currentratio	0.5996 0.0000	0.5018 0.0000	0.0560 1.0000	0.0245 1.0000	-0.0409 1.0000	0.5999 0.0000	-0.6252 0.0000
T~returngr~e	0.3623 0.0000	0.2529 0.0006	-0.0379 1.0000	-0.0498 1.0000	0.0149 1.0000	0.0961 1.0000	-0.0998 1.0000
T~sgrowthr~e	0.0985 1.0000	0.1216 1.0000	-0.0953 1.0000	-0.0989 1.0000	0.0247 1.0000	-0.0710 1.0000	0.1031 1.0000

	Divide~o	Revenu~e	Paidin~l	Number~s	Fixeda~s	Intere~o	Quickr~o
Dividendpa~o	1.0000						
Revenuegro~e	0.0067 1.0000	1.0000					
Paidincapi~l	-0.1537 0.7991	0.0996 1.0000	1.0000				
Numberofem~s	-0.0038 1.0000	-0.1005 1.0000	0.1768 0.2030	1.0000			
Fixedasset~s	0.0048 1.0000	-0.0650 1.0000	-0.3211 0.0000	0.0388 1.0000	1.0000		
Interestco~o	0.0416 1.0000	0.0554 1.0000	-0.1038 1.0000	-0.0526 1.0000	-0.0459 1.0000	1.0000	
Quickratio	0.0722 1.0000	0.0256 1.0000	-0.3905 0.0000	-0.0580 1.0000	0.0582 1.0000	0.3121 0.0000	1.0000
Currentratio	0.1177 1.0000	0.0024 1.0000	-0.4366 0.0000	-0.0585 1.0000	0.0927 1.0000	0.3169 0.0000	0.9843 0.0000
T~returngr~e	-0.0666 1.0000	0.3093 0.0000	-0.0284 1.0000	-0.0265 1.0000	0.0046 1.0000	-0.0473 1.0000	0.0943 1.0000
T~sgrowthr~e	-0.0303 1.0000	0.6140 0.0000	0.1176 1.0000	-0.1156 1.0000	-0.0998 1.0000	0.0162 1.0000	0.0023 1.0000

	Curren~o	T~retu~e	T~sgro~e
Currentratio	1.0000		
T~returngr~e	0.0694 1.0000	1.0000	
T~sgrowthr~e	-0.0301 1.0000	0.2848 0.0000	1.0000

Panels A presents descriptive statistics: mean (Mean), standard deviation (Std.dev.), minimum (min), max (Max), for the sample of 320 firm-year observations that were 32 listed Taiwanese companies selected from the 2022 DJSI.
Panel B reports Pearson correlation matrix for the sample.

Table 3. The impact of ESG on corporate reputation

(model 1 dependent variable: corporate reputation; model 2 dependent variable: corporate negative reputation score)

variables	expected	Model 1		expected	Model 2	
	symbol	regression	probit	symbol	regression	probit
ESGSCORE	+	0.1142945***	1.651997***	-	0.0539152***	0.2682118***
R&D rates	+	-1.564447	51.85524	-	-6.780843***	-44.33771***
Asset size	+	0.0527463	-0.7108976	-	-0.1095259	-0.5368101
Dividend payout ratio	-	-0.0004114	0.006687	-	-0.0001269	-0.0008488
Revenue growth rate	+	-0.0019652*	-0.024628	-	-0.0016166	-0.0087918
Paid-in capital	?	-1.17E-13	2.46E-12	?	1.03E-12	5.56E-12
Number of employees	+	1.67E-06	-3.21E-05	-	0.00000442***	0.0000265***
Financial leverage	-	-0.004998	2.80E-01	+	-1.06E-02	-0.1056004
Operating leverage	+	9.77E-04	2.00E-02	-	0.0045911	0.0274021
Fixed asset turnover times	+	0.0001781	2.84E-02	-	-0.0043006*	-0.0223782
Interest coverage ratio	+	0.0001091***	0.0015175	-	0.0001014**	0.0004989*
Quick ratio	+	-0.0015207	-0.0326061	-	-0.0009381	-0.0071473
Current ratio	+	0.0013647	0.0064467	-	0.000979	0.0074977
Total asset return growth rate	+	0.0025006	-0.0435795	-	0.0058583	0.0341381
Total assets growth rate	+	0.0008203	0.0246664	-	0.0029241	0.0171386
Intercept term		-0.1719428	1.346312		1.023666	2.453587
Adjusted-R^2		0.5228	0.9373		0.1699	0.1786
p value(F value)		<0.001	<0.001		<0.001	<0.001
N		320	320		320	320

Note: *** means significant below 0.01 level. **means significant below 0.05 level. *means significant below 0.1 level.

In all regressions, the effects of industry and year are controlled.

Table 4. The impact of ESG on company performance

(model 3 dependent variables: ROA and Tobin's Q; model 4 dependent variables: ROA and Tobin's Q)

variables	expected symbol	Model 3		Model 4	
		ROA	Tobin'sQ	ROA	Tobin'sQ
ESGSCORE	+	0.7730134***	0.0650295***	0.1481559***	0.0551462***
Reputation dum	+	-	-	1.828951**	0.0866873
Negative reputation score	-	-0.297987	-0.0756241	-0.3076293	-0.0760811
R&D rates	+	-12.06041	-0.160703	-9.264494	-0.0281843
Asset size	+	-14.98041***	-1.248597***	-15.07793***	-1.25322***
Dividend payout ratio	-	0.0103098	0.004387***	0.011061	0.0044226***
Revenue growth rate	+	-0.0215243	-0.0031037	-0.0179456	-0.0029341
Paid-in capital	?	8.29e-11***	5.93e-12***	8.31e-11***	5.94e-12***
Number of employees	+	0.0001045***	4.08e-06*	0.0001015***	0.00000394*
Financial leverage	-	0.2186561	0.0716832*	0.2276953	0.0721116*
Operating leverage	+	-0.1250569**	-0.0221671***	-0.1267986**	-0.0222497***
Fixed asset turnover times	+	-0.1281048***	-0.0097711***	-0.1284719***	-0.0097885***
Interest coverage ratio	+	0.0030334***	0.0001366*	0.0028349***	0.0001271
Quick ratio	+	0.1063438***	0.0100317***	0.109116***	0.010163***
Current ratio	+	-0.0764565***	-0.007594***	-0.078943***	-0.0077118***
Total asset return growth rate	+	0.5276879***	0.0306322***	0.523171***	0.0304181***
Total assets growth rate	+	0.0612624**	0.0096167***	0.0597903**	0.0095469***
Intercept term		128.1217***	10.78618***	128.4461***	10.80155***
Adjusted-R^2		0.7191	0.5115	0.7225	0.5108
p value		<0.001	<0.001	<0.001	<0.001
N		320	320	320	320

Note: *** means significant below 0.01 level. **means significant below 0.05 level. *means significant below 0.1 level.

In all regressions, the effects of industry and year are controlled.

Table 5. The impact of ESG on company performance

ESG effects and company reputation are both included (dependent variables: ROA and Tobin's Q)

variables	expected symbol	Model 5	
		ROA	Tobin's Q
ESGSCORE	+	0.6098755	0.1291833
Reputation dum	+	1.831989**	- 0.074347
ESGSCORE * Reputation dum	+	-0.0454379	0.1845593
Negative reputation score	-	-0.3096862	-0.0677262
R&D rates	+	-9.224867	-0.1891424
Asset size	+	-15.08239***	-1.235104 ***
Dividend payout ratio	-	0 .0110734	0.0043719***
Revenue growth rate	+	-0. 0179706	-0.0028323
Paid-in capital	?	8.31e-11***	5.86e-12***
Number of employees	+	0.0001014***	4.00e-06*
Financial leverage	-	0.2279254	0.0711768*
Operating leverage	+	-0.1250569**	-0.0224125***
Fixed asset turnover times	+	-0.1284647***	-0.0098178***
Interest coverage ratio	+	0.0028362***	0.000122
Quick ratio	+	0.1091582***	0.0100317***
Current ratio	+	-0.0790082***	0.0099916***
Total asset return growth rate	+	0.5230901***	0.0307465***
Total assets growth rate	+	0.0598311**	0.009381***
Intercept term		128.4837 ***	10.64853***
Adjusted-R^2		0.7215	0.51
p value		<0.001	<0.001
N		320	320

Note: *** means significant below 0.01 level. **means significant below 0.05 level. *means significant below 0.1 level.

In all regressions, the effects of industry and year are controlled.

V. CONCLUSION AND RECOMMENDATIONS

This chapter is divided into two sections. The first section presents a summary of the research findings and outlines the study conclusions. The study limitations are discussed, and suggestions for future research are proposed in the second section.

5.1 Research conclusions and contributions

The focus on ESG has increased, particularly in Taiwan, with its sustained attention and promotion. Since 2020, the global spread of COVID-19 has heightened the international and domestic focus on sustainability concerns, marking a shift in corporate priorities. Historically, companies have predominantly aimed to meet stakeholder expectations and maximize profits. However, in the current landscape, companies are required to demonstrate their commitment to sustainable management and corporate social responsibility, extending their responsibilities to protect the global environment. ESG positions companies as central players, with corporate governance serving as the foundation for a robust capital market. ESG-related performance is increasingly used as a measure of a company's commitment to sustainability. Clear disclosure of ESG-related information is becoming crucial for companies because failure to do so can negatively affect their reputation and market position. Therefore, the implementation of ESG practices has emerged as a key area of focus for companies. However, these challenges accompany the implementation of ESG. Despite regulatory requirements or voluntary

incentives for sustainable operations, many companies, particularly smaller ones, perceive ESG as a domain primarily for larger companies or government entities. This perception results from the substantial expenses associated with investing in ESG, which can affect the operating performance.

This study investigated the influence of corporate reputation, a situational factor, on companies' engagement in ESG activities and overall business performance. The research affirms that robust ESG performance significantly enhances operating performance. This result is consistent with those of various studies, including those by Li et al. (2011) and Chi Xiangjuan et al. (2014). This result suggests that active engagement in promoting ESG and achieving commendable ESG performance positively influences operational efficiency. The study also identified the role of "sin" industries, as identified by McWilliams and Siegel (2018), in motivating companies to engage in ESG activities. However, challenges, including the accurate calculation of environmental costs in a broader context, are also described in this study. These are often underrecorded, leading to potential distortions in the evaluation of ESG-related improvement strategies. Environmental projects aimed at reducing emissions and waste from the source, primarily through enhanced raw material utilization and minimization of hazardous material use (known as avoidance options), are not always fully recognized or implemented. However, these strategies also have considerable ecological advantages. A critical aspect often overlooked is that the costs of generating waste and

emissions typically exceed processing costs. An example of external cost implications in the ESG context is the decision of the Japanese government to discharge treated nuclear water from the Fukushima Nuclear Plant, starting on August 24, 2023. This incident exemplifies how the transfer of external costs and arbitrary allocation of negative corporate reputation costs can profoundly affect a company's reputation, with corporate reputation as an intermediary factor. Such events highlight the necessity for companies, even those that proactively fulfill their corporate citizenship responsibilities, to continuously adapt and revise their strategies to ensure sustainable operations.

5.2 Research limitations

ESG implementation necessitates long-term, continuous promotion, and periodic reviews to maintain sustainable management practices. This study used the performance scores of 32 Taiwanese companies in the DJSI for the period 2013–2022 and thus has certain limitations. Considering the decade-long research duration and sample size of 32 companies, future studies should extend these aspects to further validate and expand the findings. This study suggests three areas for refinement and improvement for future research.

First, future research should extend the follow-up period, with a focus on the yearly ESG performance evaluations of global companies in the S&P Dow Jones Indices. This approach will likely increase the credibility and predictability of the data.

Second, this study focuses on selected Taiwanese listed companies and is constrained by the scope of the S&P Dow Jones Indices' evaluation of ESG aspects. Future research should broaden its scope by including foreign companies as research subjects. This expansion would not only increase the sample size, making the research results more generalizable, but would also likely reduce potential biases in the results.

Third, the panel smooth transition regression model, developed by González, Teräsvirta, and van Dijk (2004, 2005), may offer a novel, nonlinear perspective on ESG. Using company size and paid-in capital as threshold variables, this approach enables an exploration of variations in company operating performance under different proxy variables. This method could yield valuable insights into the nuanced effects of ESG across different company sizes and capital structures.

Appendix: Variable Measurement and Definitions

Tobin's q is the ratio of a company's market capitalization to its debt book value and total assets and reflects the expected standard of the company's growth potential and future profitability. Therefore, this study uses Tobin's q as a business performance measurement variable.

$ESG_{i,t-1}$ was obtained from Taiwanese companies selected from the DJSI Dow Jones Index for 2022. Winners from 2013 to 2022 received one point each. Those who have won the

"Selected DJSI Dow Jones Index" award for ten consecutive years will receive ten points. Therefore, the ESG scores ranged from 1 to 10.

Company reputation Dum $_{i,t}$ uses a dummy variable for Taiwanese companies selected from the DJSI Dow Jones Index for 2022. Those who are sample winners from 2013 to 2022 receive 1 point; otherwise, it equals zero.

Negative reputation score $_{i,t}$ means that the Taiwanese company selected for the DJSI Dow Jones Index in 2022 appears on the Internet search list for negative ESG news at time t, which is 1; otherwise, it is 0.

Financial leverage The book value of total debt (the sum of current liabilities and long-term debt) divided by the book value of total assets.

Operating leverage refers to the ratio of a company's change in operating profit to the percentage change in sales volume if production and sales change at a certain level of production and sales.

Asset size The logarithm of total assets.

Return on assets Earnings before interest and taxes divided by total assets.

R&D expense ratio is the ratio of R&D expenses to total assets.

Sales Growth Rate The annual growth rate of total sales.

Tangible Asset Ratio Net property, plant, and equipment divided by total assets.

Dividend payout ratio dividend payout ratio, also known as "earnings distribution ratio,"

refers to the percentage of dividends to company earnings.

References

Baron, R. M., & Kenny, D. A.,1986, The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173-1182. doi: 10.1037/0022-3514.51.6.1173

Chan, L., N. Jegadeesh, and J. Lakonishok. 1996. Momentum strategies. *Journal of Finance* 51: 1681-1713

Inoue, Y., & Lee, S., 2011. Effects of different dimensions of corporate social responsibility on corporate financial performance in tourism related industries. *Tourism Management*, 32(4), 790–804

Holmbeck、G. N.2002. Post-hoc probing of significant moderation and mediation effects in studies of pediatric populations. *Journal of Pediatric Psychology*、*27*(1)、87-96.

Jia, X. ,2020. Corporate social responsibility activities and firm performance: The moderating role of strategic emphasis and industry competition. *Corporate Social Responsibility and Environmental Management*, 27(1), 65–73

Kechiche, A., & Soparnot, R.,2012. CSR within SMEs: Literature review. *International Business Research*, 5(7), 97–104.

Liang, H., & Renneboog, L.,2017. On the foundations of corporate social responsibility. *The Journal of Finance*, 72(2), 853–910. https://doi.org/ 10.1111/jofi.12487.

Lins, K. V., Servaes, H., & Tamayo, A.,2017. Social capital, trust, and firm performance: The value of corporate social responsibility during the financial crisis. *the Journal of Finance*, *72*(4), 1785-1824. https://doi.org/10.1111/jofi.12505

Liu, M., & Lu, W.,2021. Corporate social responsibility, firm performance, and firm risk: the role of firm reputation. *Asia-Pacific Journal of Accounting & Economics*, *28*(5), 525-545, DOI: 10.1080/16081625.2019.1601022

Mc Williams, A., & Siegel, D.,2018. Corporate social responsibility: A theory of the firm perspective. *Business Ethics and Strategy, Volumes I and II* (pp. 137-147). Taylor and Francis. https://doi.org/10.4324/9781315261102-8

Saeidi, S. P., Sofian, S., Saeidi, P., Saeidi, S. P., & Saaeidi, S. A. 2015. How does corporate social responsibility contribute to firm financial performance? The mediating role of competitive advantage, reputation, and customer satisfaction. *Journal of Business Research*, 68, 341–350.

Sen, S., & Bhattacharya, C. B.,2001. Does doing good always lead to doing better? Consumer reactions to corporate social responsibility. Journal of Marketing Research, 38(2), 225–243. https://doi.org/10. 1509/jmkr.38.2.225.18838

Wooldridge, Jeffrey. 2020. *Introductory Econometrics: A Modern Approach.* (7th ed.). South-Istern College Publishing,