

THE RELATIONSHIP BETWEEN ESG SCORES AND
FINANCIAL PERFORMANCE OF MALAYSIA'S
DOMESTIC SYSTEMICALLY IMPORTANT BANKS
(DSIBS)

BY

CHUA QI HEN

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We hereby declare that:

- (1) This undergraduate research project is the end result of my own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.
- (2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.
- (3) The word count of this research report is 22154.

Name of Student:

Student ID:

Signature:

Chua Qi Hen

2300998

Date: 29 April 2026

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LIST OF ABBREVIATIONS

ABM	Association of Banks in Malaysia
AI	Artificial Intelligence
ASEAN	Association of Southeast Asian Nations
BNM	Bank Negara Malaysia
CCPT	Climate Change and Principle-Based Taxonomy
CSR	Corporate Social Responsibility
DOSM	Department of Statistics Malaysia
DSIBs	Domestically Systemically Important Banks
EPF	Employees Provident Fund
ENV	Environmental Pillar Score
ESG	Environmental, Social and Governance
FE	Fixed-Effects
GDP	Gross Domestic Product
GMM	Generalised Method of Moments
GOV	Governance Pillar Score

LEV	Leverage
LSEG	London Stock Exchange Group
PRI	Principles for Responsible Investment
RBV	Resource-Based View
RE	Random-Effects
ROA	Return on Assets
ROE	Return on Equity
SIZE	Bank Size
SOC	Social Pillar Score
TCFD	Task Force on Climate-related Financial Disclosures
TOBq / Tobin's Q	Tobin's Q Ratio
VIF	Variance Inflation Factor

PREFACE

This research report is submitted in partial fulfilment of the requirements for the Bachelor of Finance (Financial Technology) with Honours at Universiti Tunku Abdul Rahman (UTAR). It marks the conclusion of my undergraduate studies and embodies the knowledge, analytical capabilities and critical thinking that I have developed over the course of my academic programme.

The motivation behind this study arose from my growing interest in sustainable finance and the increasingly prominent role that Environmental, Social and Governance (ESG) considerations play in shaping the strategic direction of financial institutions in Malaysia. As regulatory developments such as Bank Negara Malaysia's Climate Change and Principle-Based Taxonomy and the mandatory sustainability reporting requirements by Bursa Malaysia began to redefine expectations for banks, I found myself drawn to a question that remained largely unanswered in the local academic literature, whether ESG performance genuinely translates into better financial outcomes for Malaysia's Domestically Systemically Important Banks (DSIBs). This curiosity, coupled with the recognition that DSIBs

occupy a uniquely critical position in Malaysia's financial system, ultimately shaped the direction and scope of this research.

Completing this research has been a challenging yet deeply rewarding process. It required careful planning, extensive data collection from LSEG Workspace and bank annual reports, and the application of panel regression techniques that pushed me to strengthen my quantitative and econometric competencies. Beyond the technical demands, the process of critically engaging with a wide body of literature and reconciling theoretical expectations against empirical findings has sharpened my ability to think independently and interpret evidence with greater rigour.

It is my hope that this study adds value to the growing body of research on sustainable finance in Malaysia and provides useful perspectives for regulators, investors, and banking professionals navigating the evolving ESG landscape. More broadly, I hope this work reflects my dedication to producing research that is both academically sound and practically relevant.

ABSTRACT

Environmental, Social and Governance (ESG) considerations have become crucial for financial stability in the banking sector, particularly for Domestically Systemically Important Banks (DSIBs). However, empirical evidence on the relationship between ESG performance and financial outcomes for Malaysian DSIBs remains limited. This research explores ESG integration and financial outcomes among three Malaysian DSIBs: Maybank, CIMB Group Holdings, and Public Bank. It aims to identify the impact of overall ESG combined scores, alongside individual environmental, social, and governance pillar scores, on market-based and accounting-based financial performance. This study proposes a conceptual framework synthesized from Stakeholder Theory, the Resource-Based View (RBV), and Signalling Theory, utilizing the ESG scores as independent variables, Tobin's Q, Return on Assets (ROA), and Return on Equity (ROE) as dependent variables, and bank size, leverage, and GDP growth as control variables. This study uses a quantitative secondary-data research design spanning a 15-year period from 2010 to 2024. Data has been collected for 42 observations from LSEG Workspace, annual reports, World Bank and Department of Statistics Malaysia (DOSM), and has been analyzed using panel regression techniques. Descriptive statistics, correlation matrix, Variance Inflation Factor (VIF) for multicollinearity and Hausman specification tests have

been checked to validate the use of the Fixed-Effects (FE) model. Robustness tests, including one-year time-lagged ESG scores and the exclusion of COVID-19 pandemic years, were also evaluated. The findings of this study in the fixed-effects model show that the overall ESG combined score does not have a statistically significant relationship with any financial performance measure. Furthermore, the environmental pillar score has a significant negative effect on ROA and ROE, while the social and governance pillar scores do not significantly affect financial performance, resulting in none of the 12 proposed positive hypotheses being supported. Policymakers and regulatory authorities should carefully design the timing of ESG compliance requirements to balance long-term climate risk management against short-term profitability compressions experienced by banks. Bank management and institutional investors should evaluate ESG initiatives with a long-term perspective, recognizing that the upfront costs and financial burden of environmental compliance currently precede future financial returns.

Keywords: ESG, Financial Performance, Tobin's Q, Domestically Systemically Important Banks, Malaysia

Subject Area: Finance

CHAPTER 1: INTRODUCTION

1.0 Introduction

In recent decades, Environmental, Social, and Governance (ESG) have been considered and emerged as one of crucial determinants of corporate sustainability and financial stability, specifically within the banking industry (Bakri et al., 2022). The global financial landscape nowadays has undergone a significant transformation. We can notice that most of institutional investors and regulators increasingly prioritizing the integration of ESG factors into their investment or supervisory decisions. Ahmad et al. (2024) demonstrate through a comprehensive study of publicly listed companies across Asian emerging markets that ESG practices significantly impact firm financial performance, with both market-oriented measures (Tobin's Q) and internal productivity measures (ROA) showing positive associations. The findings reveal that each pillar of ESG, which are environmental, social, and governance exhibits distinct positive relationships with financial performance indicators. Malaysia, now as a rapidly developing economy with a robust financial system, has recognized awareness of the importance of aligning business operations with sustainable development principles is crucial, as financial development has been shown to be a key driver of environmental and energy-related innovation (Ahmed & Jahanzeb, 2021). According to Climate Change and Principle-Based Taxonomy (CCPT) issued by Bank Negara Malaysia in 2021, which required financial institutions including Domestically Systemically Important Banks (DSIBs) to disclose climate risks and align their activities with sustainability goals (Bank Negara Malaysia, 2020). This change in regulations highlighted the critical role of ESG performance in achieving long-term financial stability and economic resilience. D'Orazio (2025) provide crucial empirical evidence from 88 countries that demonstrates that climate-related financial policies significantly increase financial stability by improving liquidity resilience, reducing credit risk and supporting solvency positions in the banking sector.

In Malaysia, Domestically Systemically Important Banks (DSIBs) comprising Maybank, CIMB Group Holdings and Public Bank are crucial pillars of Malaysia's financial ecosystem. Their distress or failure would have substantial implications towards the domestic financial system and even the broader economy (Bank Negara Malaysia, 2020). As the member of DSIBs, these banks need to face higher capital requirements and stricter regulatory to mitigate systemic risks will be posed. At the same time, these banks are subject to increasing investor expectations regarding their ESG performance. In recent years, Malaysian and global investors have begun to apply ESG filters to their investment portfolios, which is recognizing that strong ESG practices contribute to risk mitigation and long-term value creation. For example, Employees Provident Fund (EPF), one of the largest institutional investors in Malaysia, signed the United Nations-supported Principles for Responsible Investment in 2019, which requiring the companies need to meet ESG targets to qualify for investment consideration (Employees Provident Fund, 2019). This may push the companies such as DSIBs to improve their sustainability disclosures and incorporate ESG integrations into their strategic planning.

The relationship between ESG performance and financial performance is an empirical question in the Malaysian context, especially for DSIBs. The existing studies have mentioned that ESG factors can influence corporate financial performances but did these findings can apply to DSIBs in Malaysia still remark as questionable. Rahat and Nguyen (2024) provide us robust evidence from sixteen emerging markets, which showing that ESG profiles positively impact firm valuation, with companies exhibiting superior ESG scores are achieving significantly better valuations as measured by Tobin's Q and enterprise value to sales ratios. Their results show that the value of the firms is adversely impacted by the ESG-related, highlighting the importance of ESG implementation. By understanding this relationship is crucial for regulators, investors and any entities who are seeking to balance financial performance with sustainability objectives. The complexity of this relationship is further compounded by the unique regulatory environment of DSIBs, which requires us to conduct a separate analysis using market-based performance measures.

1.1 Research Background

1.1.1 ESG in the Malaysian Banking Sector

Environmental, social, and governance factors represent a framework to assess corporate sustainability and responsible business conduct (Mohammad & Wasiuzzaman, 2021). Environmental factors involved corporate efforts to minimize reduce carbon emissions, ecological impact and manage natural resource consumption to meet broader energy efficiency and sustainable development goals (Yu et al., 2022), while social factors were related to labour practices, diversity and inclusion, community engagement and customer relations which increasingly rely on sustainable digital practices and accessible technologies to reach diverse demographics (Zhang et al., 2023). Lastly, governance factors more focused on-board composition, executive compensation, transparency and stakeholder accountability (Desai, 2024).

Nowadays, banking sector in Malaysia has been progressively implementing ESG principles as their core components for their operational and strategic frameworks. In 2022, The Association of Banks in Malaysia (ABM) launched seven ESG Principles during the Malaysian Banking Conference, it is reflecting that the sector's commitment and start contributing to sustainable finance (The Association of Banks in Malaysia, 2022). These principles aimed to guide banks in incorporating ESG considerations into governance, operational planning, corporate strategy and risk management. There are empirical evidence indicates that approximately 90% of Malaysian banks have integrated ESG aspects into their business operations (Wong, 2023). The huge adoption reflects both regulatory requirements and market-driven incentives by knowing investors increasingly recognize that banks with strong ESG performance demonstrate superior long-term stability and risk management capabilities.

Korzeb et al. (2024) reveals that although environmental and governance pillars consistently reduce default risk, the relationship is different across the various dimensions of sustainability and the banking sector. This validates that the perspective which strong ESG practices will enhance banking sector resilience and financial stability. Cantero-Saiz et al. (2024) further strengthen this evidence by finding a positive relationship between ESG scores and bank asset quality when analysing 96 international banks and measured through non-performing loan ratios and impaired loans. Their research demonstrates that higher ESG performance is associated with better asset quality, but this relationship may be moderated by profitability levels.

The adoption of ESG with Malaysian banking sector is further supported by the mandatory sustainability reporting requirements established by Bursa Malaysia in 2015. ESG reporting has been compulsory for publicly listed companies in Malaysia since 2016, although the reporting framework itself has not yet been fully standardized (Ming et al., 2024). This create both opportunities and challenges for DSIBs as they sailed through the balance between compliance, stakeholder expectations and financial performance.

1.1.2 Domestically Systemically Important Banks and Financial Performance

Domestically Systemically Important Banks (DSIBs) are the banks whose distress or failure would cause considerable disruption to the domestic financial system and even the wider economy. The Financial Stability Board and Basel Committee on Banking Supervision established criteria for identifying and regulating systemically important banks by implementing higher capital requirements and enhanced supervisory oversight (Bank Negara Malaysia, 2020). In Malaysia, the designation of DSIBs is based on factors including asset size, interconnectedness and substitutability with

other financial institutions and systemic importance to the Malaysian financial system.

Financial performance in the banking context is typically measured through accounting-based indicators such as Return on Assets (ROA) and Return on Equity (ROE) and market-based indicators such as Tobin's Q and market-to-book value ratios. ROA measures the efficiency with which banks generate profits from their asset base, reflecting operational effectiveness and risk management. ROE indicates the return generated on shareholders' equity, capturing profitability from an investor perspective. Tobin's Q, defined as the ratio of the market value of assets to the book value of assets, represents the market's valuation of a firm's net assets and has emerged as a prominent measure of firm value in contemporary finance research (Desai, 2024; Qin, 2023). This metric captures investor expectations regarding future earning potential and intangible assets, including the value of ESG practices and sustainability initiatives. The summary of research background is shown in Table 1.1 below.

Table 1.1 Summary of research background

Term	Sources
ESG in the Malaysian Banking Sector	(Mohammad & Wasiuzzaman, 2021), (Desai, 2024), (The Association of Banks in Malaysia, 2022), (Wong, 2023), (Ming et al., 2024), (Korzeb et al., 2024) and (Cantero-Saiz et al., 2024)
Domestically Systemically Important Banks and Financial Performance	(Bank Negara Malaysia, 2020), (Desai, 2024) and (Qin, 2023)

Source: Developed by own research.

1.2 Problem Statement

Despite the widespread adoption of ESG principles, there are still conflicts about financial impacts of ESG principles on market valuations and profitability of the banks or firms (Azmi et al., 2020; Shakil et al., 2019). The empirical evidence regarding the specific relationship between ESG performance and financial performance among DSIBs still remains limited. There are few research gaps in this area include. First, there are few studies have analysed the link between ESG scores and Tobin's Q, which specifically for Malaysian banks; second, most existing ESG-finance research in Malaysia focuses on accounting-based performance measures or general listed companies only rather than the DSIBs (Wong, 2023); and third, the unique regulatory environment and systemic importance of DSIBs need to conduct separate analysis employing market-based performance measures (Bank Negara Malaysia, 2020).

Domestically Systemically Important Banks (DSIBs) in Malaysia operated under stricter regulatory scrutiny and play crucial roles in Malaysia's financial stability particularly significant given that the gap. Recent regulatory developments, such as Bank Negara Malaysia's Climate Change and Principle-Based Taxonomy (CCPT) (2021), have increased compliance costs for DSIBs as they invest in climate risk modelling, data collection and sustainability reporting systems (PwC Malaysia, 2021). By understanding whether ESG investments translate into enhanced market valuations for these institutions or not is essential for stakeholders. Loan et al. (2024) provide supporting evidence from Vietnamese commercial banks, which demonstrating that ESG policy disclosure has positive effects on bank financial performance, it enhanced transparency and stakeholder confidence, particularly on ROA and ROE. Their study proves that environmental and governance disclosures has the most significant positive impacts on banking performance.

For regulators, the results can be used to influence policy decisions about the right balance between the compliance requirements of ESG and financial performance. Furthermore, investors can determine whether ESG-focused investments in DSIBs will generate superior returns by the results provide evidence. For bank

management, the findings of this study offer them a guidance on resource allocation between ESG initiatives and fulfil other corporate objectives.

Furthermore, the relationship between ESG and financial performance may be moderated by contextual factors specific to Malaysia, including the regulatory environment, market development, investor sophistication and the cultural emphasis on stakeholder capitalism. Additionally, the unique nature of ESG components suggests that different ESG pillars may have different impacts on financial performance. For instance, environmental investments often have longer payback periods compared to governance improvements, potentially creating temporal misalignment between ESG expenditures and financial returns (Weber et al., 2008). Social initiatives may generate goodwill and stakeholder loyalty, but their benefits are difficult to capture and quantify in short-term financial metrics (Ioannou & Serafeim, 2012). This heterogeneity underscores the necessity of examining not only overall ESG scores but also the individual contributions of environmental, social, and governance pillars to DSIB financial performance.

1.3 Research Questions

From the identified research problem, this study seeks to answer the following questions:

RQ1: Is there any relationship between ESG scores and Tobin's Q of Malaysian DSIBs?

RQ2: Does ESG performance improve profitability ratios (ROE, ROA) among Malaysian DSIBs?

RQ3: Which ESG pillar (Environmental, Social, or Governance) most strongly influences the financial performance of Malaysian DSIBs?

1.4 Research Objectives

To answer the research questions, this study will pursue the following objectives:

RO1: To examine the relationship between ESG scores and Tobin's Q of Malaysian DSIBs.

RO2: To evaluate the association between ESG scores and financial performance indicators (ROE, ROA).

RO3: To identify the ESG pillar with the strongest impact on Malaysian DSIBs' financial outcomes.

1.5 Significance of the Study

The findings of this research are expected to make significant contributions to academia, industry practice and policymaking. First, this study contributes to academic literature by addressing a distinct knowledge gap. Throughout the research, most related studies in Malaysia have centered only on general listed companies (Wong, 2023). This research provides an exclusive analysis of Domestic Systemically Important Banks (DSIBs), which operate under a unique and more stringent regulatory environment (Bank Negara Malaysia, 2020). By focusing on DSIBs, the study extends stakeholder theory, resource-based view and signalling theory to a critical sector where public trust and systemic stability are important (An et al., 2022; Azmi et al., 2020).

Second, this study addresses a critical measurement gap. There is a scarcity of studies that investigate the relationship between ESG scores and the market-based performance measure of Tobin's Q specifically within the Malaysian banking sector, with most research relying on traditional accounting-based indicators (Desai, 2024). By employing Tobin's Q alongside with traditional accounting metrics, which are ROA and ROE, this research provides a more holistic, forward-looking perspective on whether ESG initiatives will create long-term market value that may not be visible in short-term profits (Fu & Li, 2023).

At the same time, the findings of this study will offer tangible insights for industry professions. For the management of DSIBs, the results will provide data-driven evidence to guide strategic resource allocation, which assisting them to determine whether ESG investments are primarily a compliance cost or a real source of shareholder value (Menicucci & Paolucci, 2022). Furthermore, this research will assist investors, particularly large institutional bodies such as Employees Provident Fund (EPF) and Khazanah Nasional, which have explicitly integrated ESG filters into their investment frameworks (Employees Provident Fund, 2019). The findings will offer crucial evidence to assess whether high ESG scores among Malaysian DSIBs are a reliable signal of superior long-term financial performance and lower risk for them to invest (Fu & Li, 2023).

Finally, the study will provide valuable empirical feedback to regulatory bodies like Bank Negara Malaysia (BNM). The findings will help them evaluate the market impact of their sustainability-focused policies, such as the Climate Change and Principle-Based Taxonomy (CCPT) and assess whether these mandates are effectively fostering a financial system that is not only stable but also aligned with national sustainable development goals (ICMR, 2023; Securities Commission Malaysia, 2023).

1.6 Outline of the Study

Chapter 1: Introduction

This chapter focused on the context of the study by presenting the research background on general environment for ESG and emphasized on the unique environment for Domestic Systemically Important Banks (DSIBs). Besides, this chapter also stating the problem statement and research gaps and outlining the research questions, objectives, hypotheses and significance of the research.

Chapter 2: Literature Review

This chapter provides a comprehensive review of the relevant theoretical foundations, including Stakeholder Theory, the Resource-Based View and Signalling Theory. It also critically synthesizes empirical studies on the relationship between ESG and financial performance, with a specific focus on the banking sector.

Chapter 3: Research Methodology

This chapter draws the research methodology, including the research design, sampling design, and data sources. It provides operational definitions and measurement for all variables (ESG scores, Tobin's Q, ROA, ROE) and specifies the statistical models (panel regression) to be employed.

Chapter 4: Data Analysis

This chapter focuses on the analysis of data in relation to the study's hypotheses and research questions. It includes descriptive statistics of the variables and presents the results of the inferential analyses from the regression models.

Chapter 5: Discussion, Conclusion and Implications

The concluding chapter summarizes the study's significant findings. It highlights the important implications, draws significant inferences, examines the ramifications and limitations of the research, and makes recommendations for further research.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

This chapter provide a comprehensive literature review as reviews prior studies and theories related to the relationship between Environmental, Social and Governance (ESG) performance and the financial performance of banks. The chapter is splitted into five main sections. The first section presents the theoretical framework of the study, which are stakeholder theory, the resource-based view (RBV) and signalling theory. The second section discusses the key variables: overall ESG score, environmental, social and governance pillar scores, three financial performance indicators (Tobin's Q, ROA, ROE) and the chosen control variables. The third section identifies research gaps. The fourth section explains the conceptual framework. The final section develops the research hypotheses to be tested empirically.

2.1 Theoretical Review

2.1.1 Stakeholder Theory

Stakeholder theory argues that firms create sustainable value by addressing interests not only the shareholders, but multiple stakeholder groups. (Freeman, 1984) When we come to the banking context, stakeholder theory is relevant because banks depend on the trust of depositors, regulators and the broader community to operate smoothly and safely (An et al., 2022). When banks are engaging in ESG activities, such as managing climate risks, promoting financial inclusion and strengthening governance, they respond to stakeholder expectations and reduce their reputational and regulatory risks (An et al., 2022).

There are few empirical studies on banks support this view. An et al. (2022) find that stakeholder-oriented governance and corporate social

responsibility policies are positively linked to bank stability and financial performance. Their findings on international banks shows that stronger stakeholder engagement correlates with higher profitability and lower risk. Separately, Setyowati et al. (2025) who analyse Asia-Pacific banks reported that stakeholder-focused ESG practices enhance both profitability and financial stability, consistent with stakeholder theory predictions. Octavio et al. (2025) further explain that stakeholder theory significantly influences corporate ESG implementation, with different ownership types demonstrating different levels of ESG commitment based on stakeholder pressures and expectations. These findings suggest that higher ESG scores should be associated with better financial outcomes for Malaysian DSIBs.

2.1.2 Resource-Based View (RBV)

The resource-based view explains how firms perform outstanding than others through their internal resources and capabilities, especially those that are valuable, rare, difficult to imitate and non-substitutable (Barney, 1991). ESG-related capabilities, such as advanced climate-risk management, powerful compliance systems and strong stakeholder engagement, are to be treated as strategic resources within this framework (Assensoh-Kodua, 2019). Assensoh-Kodua (2019) stated these capabilities are often included in organizational routines and human capital, making them hard for competitors to replicate quickly.

Recent empirical evidence supports this perspective is study by Azmi et al. (2020). They examined international banks and find out that ESG capabilities create competitive advantages that translate into higher profitability and market valuation. Their findings indicate that banks with stronger environmental and governance resources achieve better financial performance. Similarly, Menicucci and Paolucci (2022) study European banks and report that ESG-oriented resources enhance their operational efficiency and reduce risk-adjusted costs, leading to improved ROA and

ROE at the end. Cardillo and Basso (2024) reinforced the resource-based view perspective by demonstrating that firms with strong ESG capabilities develop unique resources that enhance competitive advantage and long-term financial performance. Their comprehensive review proved that ESG investments create value through improved operational efficiency, risk mitigation, and enhanced stakeholder relationships. While Ahmad et al. (2024) extend this by showing that managerial ability acts as a catalyst in the ESG-financial performance relationship, which indicates that value creation from ESG resources depends significantly on management quality in Asian emerging markets. These studies collectively support the expectation that higher overall ESG scores and pillar scores can enhance bank performance.

2.1.3 Signalling Theory

Signalling theory mainly focuses on how firms communicate private information to external stakeholders to reduce information asymmetry (Spence, 1973). A firm's ESG performance and disclosure can function as signals of management quality, long-term orientation and risk management (Chen & Xie, 2022). When a bank discloses detailed ESG information voluntarily or achieves high ESG scores, it signals to investors that it has identified material non-financial risks and it manages them proactively (Fu & Li, 2023).

Empirical studies can confirm this signalling role. Chen & Xie (2022) find that stronger ESG disclosure reduces information asymmetry and attracts institutional investors with ESG preferences for global firms, thereby boosting their valuation. In the banking sector, Azmi et al. (2020) report that banks with higher ESG ratings send positive signals to the market and resulting in higher Tobin's Q plus lower cost of capital. Arshed et al. (2025) demonstrate that firms can use ESG initiatives, particularly green loans, as a signalling mechanism to increase firm performance, proving banks

improving stakeholder confidence through transparent ESG practices. Their study reveals that ESG performance reduces financial constraints by signalling strong governance and risk management capabilities to external stakeholders, thereby facilitating access to capital and improving investment efficiency. These findings indicate that ESG scores can act as significant signals that influence market perceptions for DSIBs. The summary of theoretical review with Stakeholder Theory, Resource-Based View (RBV) and Signalling theory are shown in Table 2.1.

Table 2.1: Summary theoretical review with Stakeholder Theory, Resource-Based View (RBV) and Signalling theory

Term	Sources
Stakeholder Theory	(Freeman, 1984), (An et al., 2022), (Setyowati et al., 2025) and (Octavio et al., 2025)
Resource-Based View (RBV)	(Barney, 1991), (Assensoh-Kodua, 2019), (Azmi et al., 2020), (Menicucci and Paolucci, 2022), (Cardillo & Basso, 2024) and (Ahmad et al., 2024)
Signalling Theory	(Spence, 1973), (Chen & Xie, 2022), (Fu & Li, 2023), (Azmi et al., 2020), and (Arshed et al., 2025)

Source: Developed by own research.

2.2 Discussion of the Variables

2.2.1 Overall ESG Score

Overall ESG score is a composite index summarising a firm's performance across environmental, social and governance dimensions into a single

value. Major data providers such as Refinitiv and LSEG construct these scores by combining a wide range of indicators on environmental impact, labour practices, community involvement and corporate governance structures (Khan, 2022).

Analysis of ESG and financial performance show that most studies report either a positive or neutral association between overall ESG indices and financial performance, with relatively few documenting negative relationships (Friede et al., 2015). Khan (2022) conducts a bibliometric analysis and conclude that strong ESG performance is generally compatible with firm value creation. For financial institutions, Shakil et al. (2019) find that higher combined ESG scores are associated with better profitability indicators and lower risk in a sample of emerging-market banks. Additionally, Khan et al. (2015) demonstrated that ESG scores serve as significant indicators in financial markets, a higher score reflecting better management of substantive risks. Ahmad et al. (2024) provide comprehensive evidence from Asian emerging markets showing that overall ESG scores positively impact both Tobin's Q and ROA, with the relationship moderated by managerial ability and institutional quality. Their findings found out that when institutions had more capable management, ESG investments yield greater financial returns. These findings support the use of overall ESG score as a key independent variable for DSIBs.

2.2.2 Environmental Pillar Score

The environmental pillar score reflects how well a firm manages environmental issues such as greenhouse-gas emissions, energy efficiency, resource consumption and pollution control. In the case for banks, environmental pillar also captures the environmental characteristics of their loan and investment portfolios (Fu & Li, 2023).

There are few empirical studies suggest that better environmental performance can reduce regulatory risk, improve operational efficiency and enhance access to capital. Desai (2024) report that firms with higher environmental disclosure generally posted at higher valuation ratios. Furthermore, Weber et al. (2008) examine banking portfolios and find that banks with stronger environmental screening policies experience lower credit losses and improved asset quality through reduced exposure to stranded assets and climate-related defaults. D'Orazio (2025) provide crucial evidence showing climate-related financial policies helping to reduce credit risk and improve liquidity resilience in the banking sector. Their comprehensive study of 88 countries over two decades demonstrates that effective climate-related financial policies mitigate the destabilizing effects of both physical and transition climate risks on bank credit quality, liquidity positions and solvency ratios. For banks, strong environmental policies may help limit credit losses from high-emission sectors and position them favourably in the transition to a low-carbon economy.

2.2.3 Social Pillar Score

The social pillar score measures how firms manage relationships with employees, customers, suppliers and communities. Indicators typically include labour standards, health and safety policies, diversity and inclusion, community investment and product responsibility (Khan, 2022). In banking sector, the social dimension also covered financial inclusion initiatives and responsible lending practices (Shakil et al., 2019).

Evidence regarding the financial impact of the social pillar to firms is more mixed than for the environmental and governance dimensions. Friede et al. (2015) suggest that strong social performance can enhance employee productivity and customer loyalty, thereby supporting revenue growth. However, Khan (2022) finds weak or insignificant direct relationship on profitability, possibly because social benefits are more diffuse and long-term.

Ioannou and Serafeim (2012) analyse social performance metrics across firms and found that while social investments build long-term stakeholder trust, the immediate accounting performance impact is often limited. Rizki and Putra (2024) examine ASEAN-5 banks and find out that the social pillar shows varying impacts on ROA depending on country, which suggests that the effectiveness of social initiatives in enhancing banking performance may be contingent on regional institutional factors. Their study also revealed that in countries with stronger social safety nets and labour protection regulations, the social pillar's contribution to bank profitability is more noticeable. Given this ambiguity, it is important to test whether social scores have a distinct relationship with Tobin's Q, ROA and ROE in the DSIB context.

2.2.4 Governance Pillar Score

The governance pillar score often reflects the quality of a firm's governance structures and processes, including board composition, independence, shareholder rights, transparency and internal control systems (Lee et al., 2013). Strong governance is widely recognized as a prerequisite for effective risk management and sustainable performance, especially in regulated sectors such as banking (Assensoh-Kodua, 2019).

Empirical findings consistently show that better governance is associated with lower agency costs and reduced probability of fraud. Shakil et al. (2019) report that governance weaknesses are often implicated in episodes of financial distress, while robust governance supports stable earnings and reduces downside risk for banks. Larcker et al. (2012) conduct an extensive study on governance mechanisms in financial institutions and document that strong board independence and transparent executive compensation structures reduce agency conflicts and support superior long-term performance. Korzeb et al. (2024) provide evidence from the global banking sector showing that stronger governance practices contributing to improved risk management and financial stability. Their analysis of 303 commercial banks across 61 countries demonstrates that governance quality directly

influences banks' ability to manage credit, operational, and market risks effectively. Besides, Fakhrunnas et al. (2025) further demonstrate that the governance pillar enhances banking performance in both emerging and developed countries, with this effect remaining significant even during crisis periods such as the Global Financial Crisis and COVID-19 pandemic. They proved that governance mechanisms provide stability and resilience during turbulent times. As a result, governance pillar scores are expected to display a strong positive relationship with both accounting-based and market-based performance for Malaysian DSIBs.

2.2.5 Tobin's Q

Tobin's Q is commonly used as a proxy for firm value and growth opportunities and defined as the ratio of the market value of a firm to the replacement or book value of its assets (Desai, 2024). A Tobin's Q greater than one suggests that the market values the firm more highly than its recorded assets, which may reflect expectations of future growth or the presence of valuable intangible assets such as reputation, innovation capacity or ESG capabilities (Lee et al., 2013).

Studies examining ESG and firm value often use Tobin's Q as the main dependent variable. Desai (2024) show that higher ESG disclosure is associated with higher Q ratios for a large sample of firms. Similar results are reported in emerging markets where ESG disclosure is still evolving, suggesting that investors treat ESG as a positive signal even in less mature markets (Fu & Li, 2023). Furthermore, Rahat & Nguyen (2024) provide strong empirical evidence from 16 emerging markets showing that ESG profiles positively impact firm valuation measured by Tobin's Q. Companies exhibiting superior ESG scores achieving significantly better valuations, their fundamental valuation (Tobin's Q) is affected by lagged ESG scores, while multiplier-based valuations respond to current ESG performance. Chau et al. (2025) validate this by demonstrating how

financial markets respond positively to corporate sustainability performance by showing that investors increasingly incorporate ESG information into their valuation models, recognizing ESG performance as a factor for management quality and long-term value creation by intensely influencing the behavioral aspects of the investment decision-making process (Jahanzeb, 2012).

Edmans (2011) presents evidence that firms with high employee satisfaction, a social dimension indicator, enjoy higher Tobin's Q ratios, supporting the view that non-financial indicators are capitalized in market valuations. These findings justify the inclusion of Tobin's Q as a key performance indicator in assessing the impact of ESG on Malaysian DSIBs.

2.2.6 Return on Assets (ROA)

Return on assets (ROA) is an accounting-based measurement that calculated as net income divided by total assets. It reflects how efficiently a bank utilizes its asset base to generate earnings (Shakil et al., 2019). ROA is particularly relevant for banks because their balance sheets are dominated by interest-earning assets such as loans and securities.

Among the ESG literature, ROA is frequently used as an indicator to assess whether ESG activities translate into internal efficiency gains. Shakil et al. (2019) conduct a study of emerging-market banks and find that higher ESG performance is positively related to ROA, suggesting that ESG activities can improve asset quality, customer relationships and cost management. Friede et al. (2015) also report positive or neutral links between ESG and ROA across sectors. Oikonomou et al. (2012) examine large international banks and find that ESG-committed institutions experience superior asset efficiency through improved operational processes and reduced compliance-related losses.

Besides, Shobhwani and Lodha (2024) provide evidence from India showing that ESG disclosure scores significantly impact operating performance measured by ROA, with environmental and governance disclosures demonstrating the strongest positive effects. Their study of Indian companies reveals that comprehensive ESG disclosure enhances operational efficiency and stakeholder confidence. Loan et al. (2024) further confirm these findings in the Vietnamese banking sectors, demonstrating that ESG policy disclosure has positive effects on ROA through enhanced transparency and stakeholder confidence. Specifically, their analysis of 24 Vietnamese commercial banks shows that environmental and governance disclosures exert the largest influence on ROA, with coefficients of 0.036 and 0.027 respectively at a 5% significance level. Therefore, ROA is included in this study to capture the operational impact of ESG on DSIBs.

2.2.7 Return on Equity (ROE)

Return on equity (ROE) is calculated as net income divided by shareholders' equity and represents as the return generated for equity investors (Desai, 2024). ROE is widely monitored by bank management, regulators and investors because it reflects the efficiency with which capital is employed, taking account of leverage and risk.

Empirical evidence suggests that ESG performance is generally compatible with shareholder value. Meta-analytical work by Friede et al. (2015) finds no systematic trade-off between ESG and profitability, including ROE. Studies on banks in emerging markets indicate that institutions with stronger sustainability practices often achieve equal or better ROE than peers, partly because good ESG performance can lower funding costs and reduce risk-related losses (Shakil et al., 2019). Aouadi and Marsat (2016) analyse European banks over a ten-year period and demonstrate that ESG performance, particularly governance and environmental scores, positively

influences ROE through both profitability enhancement and risk mitigation channels.

Moreover, Shobhwani and Lodha (2024) find that composite ESG disclosure scores have a significant positive impact on financial performance measured by ROE. Their research shows that ESG disclosure has the largest influence on ROE among all performance metrics examined, which indicating that comprehensive ESG reporting enhances shareholder value. Ahmad et al. (2024) demonstrated that ESG performance positively affects ROA within Asian emerging markets. Their findings suggest that in environments with higher institutional quality and more capable managers, the positive effects of ESG on profitability are boosted. Consequently, ROE is selected as the second accounting-based performance measure for Malaysian DSIBs.

2.2.8 Control Variables: Bank Size, Leverage and GDP Growth

Control variables are included to isolate the effect of ESG from other factors known to influence bank performance. Bank size is commonly measured by the natural logarithm of total assets and captures potential economies of scale and diversification (Laeven et al., 2015). Berger and DeYoung (2001) provide evidence that bank size influences efficiency and profitability through scale economies, suggesting its inclusion as a control variable.

Next, leverage typically measured as a ratio of total liabilities to total assets, influences both risk and profitability. Higher leverage can magnify returns but also increases the probability of distress, affecting valuation metrics (Shakil et al., 2019). Blundell-Wignall and Atkinson (2010) document that leverage ratios significantly affect bank financial performance and stability, particularly in emerging market.

Finally, GDP growth is used as a macroeconomic control because it affects loan demand, credit quality and overall banking sector profitability (Lins et

al., 2016). Kwan (2001) shows that macroeconomic conditions substantially influence bank profitability and asset quality. D'Orazio (2025) emphasize the importance of controlling for macroeconomic factors when assessing financial stability, showing that GDP growth and other macroeconomic indicators play significant roles in moderating the relationship between climate risks and banking performance. These three control variables are therefore incorporated to ensure that estimated relationships between ESG variables and performance measures are not driven by size, capital structure or macroeconomic conditions. Table 2.2 below shows the summary of discussion of the variables.

Table 2.2: Summary discussion of the variables

Variables	Sources
Independent variables	
1. Overall ESG Score	(Khan, 2022), (Friede et al., 2015), (Shakil et al., 2019), (Khan et al., 2015) and Ahmad et al. (2024)
2. Environmental Pillar Score	(Fu & Li, 2023), (Desai, 2024), (Weber et al., 2008) and D'Orazio (2025)
3. Social Pillar Score	(Khan, 2022), (Shakil et al., 2019), (Friede et al., 2015), (Ioannou and Serafeim, 2012) and (Rizki & Putra, 2024)
4. Governance Pillar Score	(Lee et al., 2013), (Assensoh-Kodua, 2019), (Shakil et al., 2019), (Larcker et al., 2012), (Korzeb et al., 2024), and (Fakhrunnas et al., 2025)
Dependent variable	
1. Tobin's Q	(Desai, 2024), (Lee et al., 2013), (Fu & Li, 2023), (Rahat & Nguyen, 2024), (Chau et al., 2025) and (Edmans, 2011)

2. Return on Assets (ROA)	(Shakil et al., 2019), (Friede et al., 2015), (Oikonomou et al., 2012), (Shobhwani & Lodha, 2024), and (Loan et al., 2024)
3. Return on Equity (ROE)	(Desai, 2024), (Friede et al., 2015), (Shakil et al., 2019), (Aouadi & Marsat, 2016), (Shobhwani & Lodha, 2024) and (Ahmad et al., 2024)
Contol variables	
1. Bank Size	(Laeven et al., 2015) and (Berger and DeYoung, 2001)
2. Leverage	(Shakil et al., 2019) and (Blundell-Wignall and Atkinson, 2010)
3. GDP Growth	(Lins et al., 2016), (Kwan, 2001) and (D'Orazio, 2025)

Source: Developed by own research.

2.3 Research Gaps

Although research on ESG and financial performance has grown rapidly, several gaps remain in the context of Malaysian DSIBs. Firstly, most of the evidence is based on broad samples of listed firms or banks in developed markets, while there are relatively few studies focus specifically on domestically systemically important banks in emerging economies (Friede et al., 2015; Khan, 2022). DSIBs is operating under stricter regulatory regimes and carry higher systemic importance, which may alter how ESG affects their risk profile and profitability.

Secondly, many of existing studies use a single aggregate ESG score, whereas fewer decompose ESG into environmental, social and governance pillars and examine their separate impacts on different performance measures (Desai, 2024). Prior

studies suggest that the three pillars may influence performance through different channels, so more evidence is needed on how each pillar relates to both accounting-based and market-based indicators in banking sector (Lee et al., 2013). Cantero-Saiz et al. (2024) highlight this gap by demonstrating that the ESG-asset quality relationship in banking different depending on profitability levels and regional contexts, which emphasizing the need for pillar-specific analysis.

Third, empirical work for Malaysia and the wider ASEAN region remains limited compared with Europe and North America, even though regulators and investors in these markets are increasingly emphasizing ESG (Shakil et al., 2019). A focused study on Malaysian DSIBs that uses consistent ESG data and examines Tobin's Q, ROA and ROE can therefore contribute to filling these gaps and provide locally relevant evidence for policymakers and practitioners. Table 2.3 shows Summary research gaps with exploring the relationship between ESG scores and financial performance of Malaysia's Domestic Systemically Important Banks (DSIBs).

Table 2.3: Summary research gaps with exploring the relationship between ESG scores and financial performance of Malaysia's Domestic Systemically Important Banks (DSIBs)

No	Term	Sources
1	Limited studies in the context of Malaysian Domestic Systemically Important Banks (DSIBs)	(Friede et al., 2015) and (Khan, 2022)
2	Lack of focus on ESG individual pillar score	(Desai, 2024), (Lee et al., 2013) and (Cantero-Saiz et al., 2024)
3	Limited empirical work for Malaysia and the wider ASEAN region.	(Shakil et al., 2019)

Source: Developed by own research.

2.4 Conceptual Framework

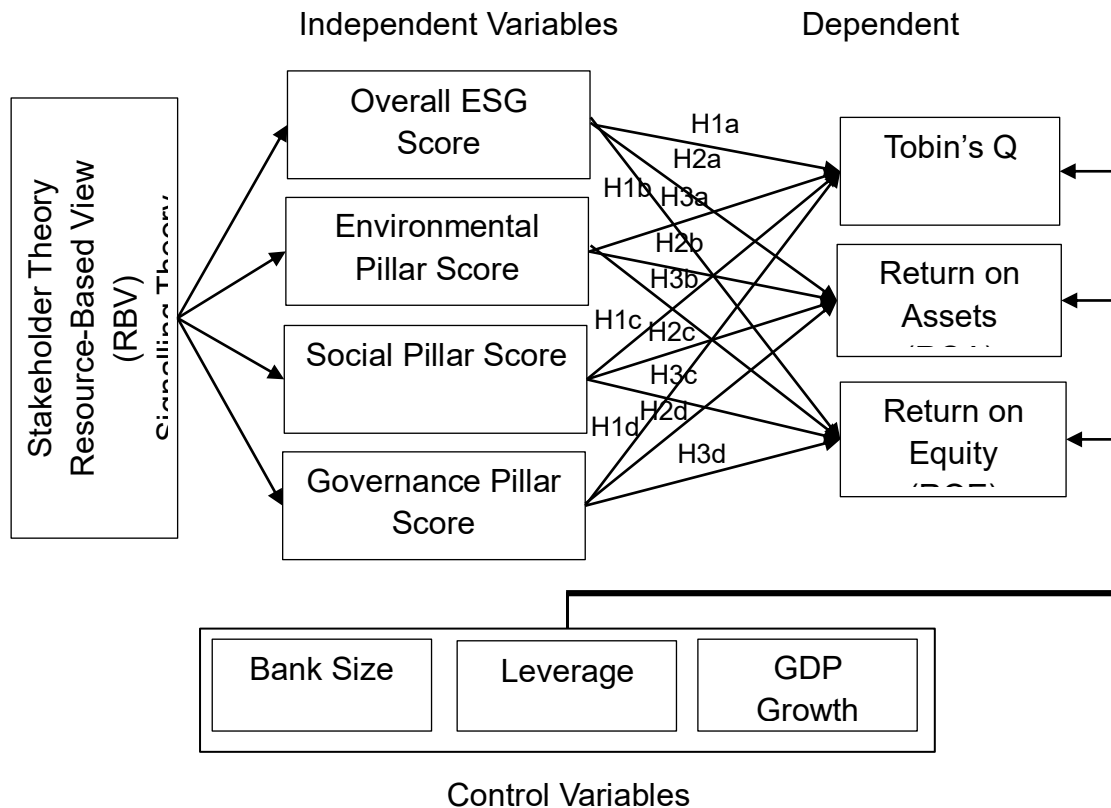


Figure 2.4: Conceptual Framework of the Study

Based on stakeholder theory, RBV and signalling theory, the conceptual framework proposes that overall ESG score and the three pillar scores, which are environmental, social and governance are act as independent variables influencing the financial performance of Malaysian DSIBs. Financial performance is captured using market-based measurement (Tobin's Q) and two accounting-based measures (ROA and ROE). Bank size, leverage and GDP growth are included as control variables to account for structural and macroeconomic influences on performance.

The framework assumes that higher ESG performance reflects valuable capabilities, better stakeholder relationships and more credible signals to investors. These mechanisms are expected to improve operational efficiency, reduce risk and enhance investor confidence, which in turn should be reflected in higher ROA, ROE and Tobin's Q (Chen & Xie, 2022). The conceptual diagram provided in Figure 2.4.1 visually summarizes these hypothesised relationships.

2.5 Hypotheses Development

2.5.1 ESG and Tobin's Q

Studies on ESG and firm value generally report that higher ESG scores and better sustainability disclosure are associated with higher valuation ratios, including Tobin's Q (Desai, 2024). Based on signalling and stakeholder arguments, this study proposes the following hypotheses:

H1a: Overall ESG score is positively related to Tobin's Q of Malaysian DSIBs.

H1b: Environmental pillar score is positively related to Tobin's Q of Malaysian DSIBs.

H1c: Social pillar score is positively related to Tobin's Q of Malaysian DSIBs.

H1d: Governance pillar score is positively related to Tobin's Q of Malaysian DSIBs.

2.5.2 ESG and ROA

RBV suggests that ESG capabilities can improve internal efficiency and risk management, which should be reflected in ROA (Assensoh-Kodua, 2019). Empirical findings on banks in emerging markets indicate a positive association between ESG performance and ROA (Shakil et al., 2019). Therefore, the following hypotheses are formulated:

H2a: Overall ESG score is positively related to ROA of Malaysian DSIBs.

H2b: Environmental pillar score is positively related to ROA of Malaysian DSIBs.

H2c: Social pillar score is positively related to ROA of Malaysian DSIBs.

H2d: Governance pillar score is positively related to ROA of Malaysian DSIBs.

2.5.3 ESG and ROE

ROE reflects returns to equity holders and is influenced by profitability and leverage. Prior research finds that ESG performance is generally compatible with shareholder value and can support stable or improved ROE (Friede et al., 2015). Based on these insights, the study proposes:

H3a: Overall ESG score is positively related to ROE of Malaysian DSIBs.

H3b: Environmental pillar score is positively related to ROE of Malaysian DSIBs.

H3c: Social pillar score is positively related to ROE of Malaysian DSIBs.

H3d: Governance pillar score is positively related to ROE of Malaysian DSIBs.

2.6 Chapter Summary

This chapter has presented the theoretical framework, key variables, empirical evidence and research gaps related to ESG and bank financial performance. Stakeholder theory, RBV and signalling theory jointly suggest that ESG performance, both overall and by pillar are able to create value by enhancing

stakeholder relationships, building strategic capabilities and sending credible signals to investors. Most of prior studies report positive or neutral associations between ESG and financial performance, but evidence for DSIBs in Malaysia remains limited. The proposed conceptual framework and hypotheses developed in this chapter provide the foundation for the empirical analysis described in the next chapter.

CHAPTER 3: METHODOLOGY

3.0 Introduction

This chapter outlines the methodological framework adopted to empirically investigate the relationship between Environmental, Social and Governance (ESG) scores and the financial performance of Malaysian Domestic Systemically Important Banks (DSIBs). The study adopts a secondary-data design and employs panel regression techniques to test the hypotheses developed in Chapter 2, using ESG scores and financial performance information that had been extracted from LSEG Workspace and bank annual reports for Malayan Banking Berhad, CIMB Group Holdings and Public Bank, which spanning from 2010 to 2024.

The chapter is organised into six sections. The section 3.1 presents the conceptual framework that underpins the study. Section 3.2 specifies the econometric models to be estimated, including a justification for the choice of panel regression with fixed-effects and random-effects estimators. The section 3.3 and 3.4 sections define and operationalise the dependent, key independent, and control variables, respectively. The section 3.5 discusses the robustness tests conducted to verify the stability and reliability of the findings. Last, section 3.6 concludes with a summary that provides a linkage to Chapter 4.

3.1 Conceptual Framework

In a secondary research, a conceptual framework is a theoretical structure that guides our research by outlining the key concepts, variables and their relationships by providing a systematic means of understanding and analysing the topic of study (Rahat & Nguyen, 2024). The conceptual framework of this study is grounded in three theoretical perspectives discussed in Chapter 2, which are Stakeholder Theory (Freeman, 1984), the Resource-Based View (Barney, 1991) and Signalling Theory (Spence, 1973). Together, these theories provide us a wide range of perspectives

through which the relationship between ESG and financial performance can be examined for Malaysian Domestic Systemically Important Banks (DSIBs).

The key concepts underpinning under the framework are ESG performance and bank financial performance. ESG performance is conceptualised as a complex construct, which measured along environmental, social, and governance pillars to reflecting a bank's sustainability practices, stakeholder engagement and governance quality (Khan, 2022). In contrast, financial performance is measured using both a market-based indicator, Tobin's Q and two accounting-based indicators, which are Return on Assets (ROA) and Return on Equity (ROE) to provide a more comprehensive and forward-looking assessment of value creation to banks (Desai, 2024; Shakil et al., 2019).

The independent variables of this study comprise the overall ESG combined score and three individual pillar scores, the environmental, social and governance pillar scores, they all measured on a scale of 0 to 100 and sourced from LSEG Workspace. The dependent variables are Tobin's Q, ROA, and ROE. The framework also incorporates three control variables, which are bank size, leverage, and GDP growth rate. It include to account for firm-specific and macroeconomic influences that may confound the ESG–financial performance relationship.

The conceptual framework hypothesises that higher ESG performance, both in combined and across individual pillars, will positively influences the financial performance of Malaysian Domestic Systemically Important Banks (DSIBs). From a stakeholder theory perspective, banks that proactively address the interests of depositors, regulators and the broader community through robust ESG practices are expected to increase their reputation and reduce the regulatory risks, thereby it can improving their profitability and market valuation (An et al., 2022). Next, from a resource-based view standpoint, ESG-related capabilities such as advanced climate-risk management systems, comprehensive compliance frameworks and strong stakeholder engagement, constitute a crucial and hard-to-replicate strategic resources that promote for better financial results. (Azmi et al., 2020; Menicucci & Paolucci, 2022). Last, high ESG scores and detailed sustainability disclosures reduce information asymmetry between bank management and external investors from a signalling theory perspective, which can attracting capital at lower costs and boosting market valuations for firms (Chen & Xie, 2022; Fu & Li, 2023).

Furthermore, the framework acknowledges that each pillar may operate through well defined channels. Environmental performance is expected to reduce credit losses from high-emission sectors and regulatory compliance costs (Weber et al., 2008; D'Orazio, 2025). Social performance is expected to enhance employee productivity and customer loyalty, but its short-term accounting impact may be more limited (Friede et al., 2015; Ioannou & Serafeim, 2012). Governance performance is expected to lower agency costs, strengthen risk management and support stable earnings (Shakil et al., 2019; Korzeb et al., 2024). The visual representation of these hypothesised relationships is provided in Figure 2.4.1 in Chapter 2.

The study also recognises that the relationship between ESG and financial performance may be moderated by structural and macroeconomic factors due to unique environment for Malaysian banking context. Accordingly, bank size, leverage, and GDP growth are included as control variables to isolate the direct effects of ESG on financial performance and to ensure that the estimated coefficients are not driven by confounding factors.

3.2 Model Specifications

In this research, the data will be analyzed through the panel data analysis method to determine the relationship between ESG scores and the financial performance of three Malaysian DSIBs, which are Maybank, CIMB Group Holdings and Public bank during the period between 2010 and 2024. Panel data combines cross-sectional and time-series aspects, which enabling the study to control for unobserved heterogeneity across banks and to exploit variation in ESG performance over time (Hsiao, 2007). Since there are small sample of three banks observed over 15 years, panel regression is particularly appropriate as it increases the number of observations and enhances the statistical power of the analysis compared with purely cross-sectional or time-series approaches (Hsiao, 2007).

There are two main models specified in this study. Model 1 examines the relationship between the overall ESG combined score and each of the three financial

performance measures. Model 2 disaggregates the ESG score into its environmental, social, and governance pillar scores and tests the relationships between the individual pillar scores and financial performance. This decomposition is consistent with recent studies that find significant differences across pillars in their effects on bank outcomes (Desai, 2024; Rizki & Putra, 2024).

Two panel estimators are applied in this study: the Fixed-Effects (FE) model and the Random-Effects (RE) model. The FE model controls for all time-invariant unobserved bank-specific characteristics, such as ownership structure, corporate culture, and founding history by allowing each bank to have its own intercept. This is important because DSIBs vary significant in size, strategic orientation and legacy governance arrangements that may be correlated with both ESG scores and financial performance. By contrast, the RE model treats unobserved heterogeneity as uncorrelated with the explanatory variables and estimates a single intercept, which yielding more efficient estimates when its assumptions hold (Azmi et al., 2020). Prior studies on ESG and bank performance in emerging markets have employed both estimators, often finding that FE models are more appropriate for panels where bank-specific characteristics are likely to be correlated with ESG choices (Shakil et al., 2019; Menicucci & Paolucci, 2022).

To determine the more appropriate estimator, the Hausman (1978) specification test is applied after estimating both FE and RE models for each equation. The Hausman test measures the correlation of the unobserved individual effects with the regressors. The null hypothesis is that the RE estimator is consistent and efficient, so there is no systematic correlation between the individual effects and the explanatory variables. If the test statistic is significant ($p < 0.05$), the FE model is preferred since it remains consistent even in the presence of such correlation; otherwise, the test fails to reject the null leading to the preference of the RE model based on its efficiency gains (Hausman, 1978). This two-step procedure of estimating both models and selecting based on the Hausman test follows the approach used by Ahmad et al. (2024) and Rahat & Nguyen (2024), which ensuring that model selection is data-driven.

Prior to running the panel regressions, standard diagnostic tests are conducted to verify the validity of the models. The variance inflation factor (VIF) is computed to

assess multicollinearity among the independent variables, with a threshold of VIF less than 10 used to confirm its absence.

The formal model specifications are presented below. Three separate equations are estimated for Model 1 for each dependent variable:

Model 1: Overall ESG Score and Financial Performance

$$\text{Financial Performance} = \beta_0 + \beta_1 \text{ESG Score} + \beta_2 \text{Bank Size} + \beta_3 \text{Leverage} + \beta_4 \text{GDP Growth} + \varepsilon$$

Where:

Financial Performance = Tobin's Q, ROA, or ROE for DSIB

ESG Score = Overall ESG combined score (0–100) from Refinitiv/LSEG

Bank Size = Natural logarithm of total assets (control variable)

Leverage = Total debt divided by total equity ratio (control variable)

GDP Growth = Annual GDP growth rate for Malaysia (control variable)

ε = Error term

The three separate equations for each dependent variable are:

$$\text{Tobin's } Q = \beta_0 + \beta_1 \text{ESG Score} + \beta_2 \text{Bank Size} + \beta_3 \text{Leverage} + \beta_4 \text{GDP Growth} + \varepsilon \quad (\text{Eq. 1})$$

$$\text{ROA} = \beta_0 + \beta_1 \text{ESG Score} + \beta_2 \text{Bank Size} + \beta_3 \text{Leverage} + \beta_4 \text{GDP Growth} + \varepsilon \quad (\text{Eq. 2})$$

$$\text{ROE} = \beta_0 + \beta_1 \text{ESG Score} + \beta_2 \text{Bank Size} + \beta_3 \text{Leverage} + \beta_4 \text{GDP Growth} + \varepsilon \quad (\text{Eq. 3})$$

Model 2: ESG Pillars and Financial Performance

$$\text{Financial Performance} = \beta_0 + \beta_1 \text{Env Pillar} + \beta_2 \text{Soc Pillar} + \beta_3 \text{Gov Pillar} + \beta_4 \text{Bank Size} + \beta_5 \text{Leverage} + \beta_6 \text{GDP Growth} + \varepsilon$$

Where:

Env Pillar = Environmental pillar score (0–100)

Soc Pillar = Social pillar score (0–100)

Gov Pillar = Governance pillar score (0–100)

The three separate equations for each dependent variable are:

$$\text{Tobin's } Q = \beta_0 + \beta_1 \text{ Env} + \beta_2 \text{ Soc} + \beta_3 \text{ Gov} + \beta_4 \text{ Bank Size} + \beta_5 \text{ Leverage} + \beta_6 \text{ GDP Growth} + \varepsilon \quad (\text{Eq. 4})$$

$$\text{ROA} = \beta_0 + \beta_1 \text{ Env} + \beta_2 \text{ Soc} + \beta_3 \text{ Gov} + \beta_4 \text{ Bank Size} + \beta_5 \text{ Leverage} + \beta_6 \text{ GDP Growth} + \varepsilon \quad (\text{Eq. 5})$$

$$\text{ROE} = \beta_0 + \beta_1 \text{ Env} + \beta_2 \text{ Soc} + \beta_3 \text{ Gov} + \beta_4 \text{ Bank Size} + \beta_5 \text{ Leverage} + \beta_6 \text{ GDP Growth} + \varepsilon \quad (\text{Eq. 6})$$

3.3 Dependent and Key Independent Variables

This section defines, operationalises and justifies the selection of all dependent variables and key independent variables included in this study. The measurement of each variable follows established conventions in the ESG and banking literature and data are sourced primarily from LSEG Workspace and the annual reports of the three Malaysian DSIBs. Table 3.1 at the end of this chapter provides a consolidated measurement summary.

3.3.1 Dependent Variables

3.3.1.1 Tobin's Q

Tobin's Q is defined as the ratio of the market value of a firm's assets to the book value of its assets and serves as the primary market-based performance indicator in this study (Desai, 2024). A Tobin's Q value over one indicates that the market has attributes value to the firm beyond its recorded net assets,

which may reflect the expectations of future earnings by investor in the market and intangible resources such as brand equity or the value of ESG-related capabilities (Lee et al., 2013). Tobin's Q is especially appropriate for examining ESG effects on performance because it is forward-looking and incorporates non-financial information that accounting-based measures may not fully capture (Fu & Li, 2023). Prior studies confirm that higher ESG scores are related with higher Tobin's Q values in emerging markets, including a study of 16 emerging markets by Rahat & Nguyen (2024), who find that firms with superior ESG profiles achieve significantly better market valuations. Likewise, Chau et al. (2025) validate that financial markets positively responding in term of corporate sustainability performance, demonstrating that investors integrate ESG information into their valuation models. The computation of the Q of Tobin is presented as the total of market capitalisation and the book value of total liabilities divided by total assets following the simplified approach adopted by Azmi et al. (2020) and Desai (2024). Data are retrieved from LSEG Workspace and cross-checks with the annual reports of Maybank, CIMB Group Holdings, and Public Bank.

3.3.3.2 Return on Assets (ROA)

Return on Assets (ROA) is calculated as net income divided by total assets and measures how efficiently a bank utilises its asset base to generate earnings (Shakil et al., 2019). ROA is an accounting-based indicator that is widely used in ESG and banking research because it reflects operational efficiency, asset quality and cost management, which are directly influenced by ESG practices. Shakil et al. (2019) conduct a cross-country study of emerging-market banks and document a positive association between ESG performance and ROA, suggesting that ESG activities improve customer relationships and reduce compliance-related costs. Loan et al. (2024) validated this finding in the Vietnamese banking context, demonstrating that environmental and governance disclosures exert the strongest positive

effects on ROA. Shobhwani and Lodha (2024) further confirm that ESG disclosure scores significantly improve ROA in Indian companies. ROA data are expressed as a percentage and are obtained from LSEG Workspace and annual reports from DSIBs.

3.3.3.3 Return on Equity (ROE)

Return on Equity (ROE) is calculated as net income divided by shareholders' equity and represents the return generated on equity capital (Desai, 2024). ROE is a primary performance metric for bank management, regulators and investors because it integrates profitability and leverage, thereby capturing the efficiency of capital deployment (Shakil et al., 2019). ESG performance is expected to be compatible with sustained or improved ROE because higher ESG scores may reduce funding costs, enhance risk management and foster stakeholder loyalty, which contribute to profitability (Friede et al., 2015). Aouadi and Marsat (2016) analyse European banks over ten years and find that governance and environmental scores positively influence ROE through both profitability enhancement and risk mitigation channels. Shobhwani and Lodha (2024) further report that composite ESG disclosure scores have the largest positive impact on ROE among all performance measures examined. ROE data are expressed as a percentage and are retrieved from LSEG Workspace and annual reports.

3.3.2 Key Independent Variables

3.3.2.1 Overall ESG Score

The overall ESG score is a composite index, which is ranging from 0 to 100. It summarises a firm's performance across environmental, social, and governance dimensions (Khan, 2022). Scores are sourced from LSEG Workspace, which computes them from over 500 individual data points,

making the database among the most comprehensive and widely used in academic ESG research (Ahmad et al., 2024). The use of LSEG Workspace scores is consistent with prior studies on emerging-market banks, including Shakil et al. (2019) and Azmi et al. (2020). A higher score indicates stronger overall sustainability performance. Khan (2022) conducts a bibliometric analysis and concludes that higher ESG performance is generally associated with firm value creation. Ahmad et al. (2024) provide comprehensive evidence from Asian emerging markets showing that overall ESG scores positively impact both Tobin's Q and ROA, with the relationship strengthened by managerial ability and institutional quality. The overall ESG score forms the basis of Model 1.

3.3.2.2 Environmental Pillar Score

The environmental pillar score measures a bank's management of environmental issues such as greenhouse-gas emissions, energy efficiency, water consumption and the environmental characteristics of its loan and investment portfolios (Fu & Li, 2023). Environmental performance is expected to reduce regulatory risk, minimise exposure to stranded assets, and improve long-term asset quality (Weber et al., 2008). D'Orazio (2025) provides evidence across 88 countries that climate-related financial policies materially improve financial stability by reducing credit risk and enhancing liquidity resilience, underscoring the importance of environmental management for bank performance. The environmental pillar score is sourced from LSEG Workspace on a 0 to 100 scale and is used as an independent variable in Model 2.

3.3.2.3 Social Pillar Score

The social pillar score captures a bank's management of relationships with

employees, customers, suppliers and communities. It encompassed indicators such as labour standards, diversity and inclusion, health and safety policies, financial inclusion, and responsible lending practices (Khan, 2022; Shakil et al., 2019). Social performance is anticipated to improve employee productivity, customer loyalty and community goodwill, although its direct impact on short-term accounting profitability may be more ambiguous (Friede et al., 2015; Ioannou & Serafeim, 2012). Rizki & Putra (2024) examine ASEAN-5 banks and find that the social pillar's impact on ROA varies across countries depending on regional institutional conditions, highlighting the importance of testing this relationship in the specific Malaysian context. The social pillar score is sourced from LSEG Workspace on a 0 to 100 scale and is employed in Model 2.

3.3.2.4 Governance Pillar Score

The governance pillar score reflects the quality of a bank's governance structures and processes, including board composition and independence, executive compensation transparency, anti-corruption measures, shareholder rights and internal control systems (Lee et al., 2013). Strong governance is consistently identified as a prerequisite for effective risk management and sustainable financial performance, especially in regulated banking environments like DSIBs (Assensoh-Kodua, 2019). Korzeb et al. (2024) provided evidence from 303 commercial banks across 61 countries demonstrating that governance quality directly reduces banks' default risk and improves risk management capabilities. Fakhrunnas et al. (2025) further confirm that the governance pillar enhances banking performance in both emerging and developed countries and this effect remaining significant during crisis periods. The governance pillar score is sourced from LSEG Workspace on a 0 to 100 scale and is incorporated in Model 2.

3.4 Control Variables

All regression models incorporate three control variables to isolate the effect of ESG scores on financial performance by other structural and macroeconomic factors. The selection of these control variables is consistent with prior ESG-banking studies (Azmi et al., 2020; Shakil et al., 2019; D'Orazio, 2025).

3.4.1 Bank Size

Bank size is measured as the natural logarithm of total assets, a standard transformation which removes the skewness inherent in large absolute asset values and allows meaningful comparisons across banks of different scales. The bigger the banks, the more they may benefit in economies of scale, greater diversification and enhanced access to capital markets, all of which could independently influence profitability and market valuation (Laeven et al., 2015). Berger and DeYoung (2001) provide evidence that bank size influencing operational efficiency and profitability through scale economies. On the other hand, extremely large banks can be diseconomies or subjected to heightened regulatory oversights that limited performance. By including bank size as a control variable, we can ensure that any observed ESG-performance relationship is not confounded by size differentials among Maybank, CIMB Group Holdings, and Public Bank, which differ substantially in total assets. Data are retrieved from LSEG Workspace and annual reports.

3.4.2 Leverage

Leverage is measured as the ratio of total debt to total equity and captures the extent to which a bank finances its assets with borrowed funds. Higher leverage amplifies returns on equity but increases the probability of financial distress and reduces financial flexibility at the same time, thereby

impacting both profitability and market valuation (Shakil et al., 2019). Blundell-Wignall and Atkinson (2010) document that leverage ratios significantly affect bank financial performance and stability, especially in emerging markets. In the DSIB context, leverage is also monitored by regulators as a key prudential indicator, and the inclusion of leverage as a control variable ensures that differences in capital structure among the three banks do not distort the ESG coefficient estimates. Leverage data are sourced from LSEG Workspace and cross-checks with annual reports.

3.4.3 GDP Growth

GDP growth is measured as Malaysia's annual percentage change in real gross domestic product and serves as the primary macroeconomic control variable. Banking sector profitability, loan demand, and credit quality are closely linked to economic cycles. During periods of strong economic growth, banks typically experience higher loan volumes, lower non-performing loan ratios and improved overall performance (Kwan, 2001; Lins et al., 2016). D'Orazio (2025) emphasises that the importance of controlling for macroeconomic conditions when examining the relationship between ESG and financial performance in banking sector, noting that GDP growth and other macroeconomic indicators materially moderate the effects of climate risks on bank outcomes. Including GDP growth as a control variable ensures that any measured ESG effect on financial performance is not merely capturing favourable macroeconomic conditions. Annual GDP growth data are sourced from the World Bank and the Department of Statistics Malaysia (DOSM). Variables measurement are summarised in Table 3.1 below.

Table 3.1: Summary of Variable Measurement

Type	Variable	Measurement	Source
Independent	Overall ESG Score	ESG Combined Score (0–100)	LSEG Workspace
	Environmental Pillar Score	ESG Individual Pillar Score (0–100)	LSEG Workspace
	Social Pillar Score	ESG Individual Pillar Score (0–100)	LSEG Workspace
	Governance Pillar Score	ESG Individual Pillar Score (0–100)	LSEG Workspace
Dependent	Tobin's Q	(Market Value of Assets) / Book Value of Assets	LSEG Workspace; Annual Reports
	Return on Assets (ROA)	Net Income / Total Assets (%)	LSEG Workspace; Annual Reports
	Return on Equity (ROE)	Net Income / Shareholders' Equity (%)	LSEG Workspace; Annual Reports
Control	Bank Size	Natural logarithm of total assets	LSEG Workspace; Annual Reports
	Leverage	Total Debt / Total Equity	LSEG Workspace; Annual Reports
	GDP Growth	Annual real GDP growth rate (%)	World Bank; DOSM Malaysia

Source: Developed by own research.

3.5 Robustness Tests

Robustness tests are conducted to assess the stability and reliability of the primary regression results by verifying that the findings are not sensitive to changes in the model specification, variable measurement or sample composition (Ahmad et al., 2024). Two robustness tests are employed in this study.

3.5.1 Time-Lagged ESG Scores

The first robustness test introduces a one-year lag to all ESG independent variables. There are well-founded theoretical reasons to expect a delayed

relationship between ESG investments and financial outcomes. Environmental investments, such as climate-risk management systems and governance improvements, such as board restructuring, typically require time before they translate into observable profitability gains or market re-ratings (Weber et al., 2008). In addition, using lagged ESG scores mitigates potential reverse causality concerns, as it ensures that the ESG score in year $t-1$ predates the financial performance outcome measured in year t , thus establishing a temporal precedence that is more consistent with a causal interpretation (Rahat & Nguyen, 2024). Rahat & Nguyen (2024) demonstrate in their study of sixteen emerging markets that lagged ESG scores retain a significant positive relationship with Tobin's Q, confirming the validity of this approach. The lagged specifications re-estimate Equations 1 to 6 by replacing current-period ESG variables with their one-year lagged counterparts, while keeping all control variables in the present year.

3.5.2 Exclusion of COVID-19 Years

The second robustness test re-estimates the main models by excluding the COVID-19 pandemic years of 2020 and 2021. The COVID-19 pandemic represents an extraordinary macroeconomic shock that severely disrupted banking operations, financial markets and economic conditions globally (Duan et al., 2021). During this period, the financial performance of Malaysian banks was materially affected by regulatory forbearance measures, loan moratoriums and heightened credit-risk provisions, while ESG disclosures and scoring may have also been temporarily impaired due to data collection disruptions (Rizwan et al., 2020). These pandemic-specific dynamics could introduce noise into the estimated ESG–performance relationship, inflating or attenuating the true structural coefficients. By removing the observations for 2020 and 2021 and re-estimating all six equations on the remaining sample (2010 to 2019 and 2022 to 2024), this test verifies that the primary findings are not primarily driven

by the distortions introduced by the pandemic period. If the direction and significance of the ESG coefficients remain broadly consistent with the main results after excluding these years, confidence in the robustness and generalisability of the findings is substantially increased.

3.6 Chapter Summary

This chapter has outlined the comprehensive framework adopted to examine the relationship between ESG scores and the financial performance of Malaysian DSIBs. The conceptual framework, grounded in stakeholder theory, the resource-based view, and signalling theory, proposes that higher overall ESG scores and individual pillar scores positively influence Tobin's Q, ROA and ROE through three complementary mechanisms, which are enhanced stakeholder relationships, development of strategic ESG capabilities and credible signalling of management quality to investors. Bank size, leverage and GDP growth are incorporated as control variables to account for firm-level and macroeconomic confounding factors.

The study employs panel data analysis across two models, with both fixed-effects and random-effects estimators applied to six regression equations. The Hausman test is used to select the more appropriate estimator on a data-driven basis after both models are estimated. By using this method, the research remains robust and aligns perfectly with how other studies have successfully examined the relationship between ESG and bank performance in developing economies like Malaysia. Two robustness tests are additionally conducted, a time-lagged specification to address temporal dynamics and potential reverse causality, and a sample that excludes the COVID-19 years of 2020 and 2021 to verify that the findings are not driven by pandemic-specific distortions.

The findings from the analyses described in this chapter will be presented in Chapter 4, which provides the descriptive statistics for all variables and the results of the fixed-effects, random-effects and Hausman-selected panel regression models, along with the outcomes of the robustness tests.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

This chapter presents the empirical findings of the study, which examines the relationship between Environmental, Social and Governance (ESG) scores and the financial performance of Malaysian Domestically Systemically Important Banks (DSIBs). Building upon the methodological framework established in Chapter 3,

which specified two panel regression models: Model 1 examining the overall ESG combined score and Model 2 decomposing ESG into its environmental, social and governance pillar scores, this chapter proceeds to analyse and interpret the empirical evidence derived from a panel dataset comprising three Malaysian DSIBs, which are Maybank, CIMB Group Holdings and Public Bank spanning the period from 2010 to 2024.

The chapter is organised into five sections. Section 4.1 provides a comprehensive overview of the descriptive statistics for all variables that are included in the study. Section 4.2 presents the pre-estimation diagnostic tests conducted to validate the appropriateness of the panel regression models, encompassing correlation analysis, multicollinearity test and the Hausman specification test. Section 4.3 presents and discusses the main regression results for both Model 1 and Model 2, with extensive comparisons to prior empirical studies. Section 4.4 reports the outcomes of two robustness checks including a one-year lagged ESG specification and an estimation that excludes the COVID-19 pandemic years of 2020 and 2021. Section 4.5 summarises the major empirical themes of the chapter and provides a linkage to Chapter 5.

4.1 Descriptive Statistics

Table 4.1 presents the descriptive statistics for all variables employed in this study, based on 42 observations derived from three Malaysian DSIBs over the 2010–2024 study period. These measures provide an essential overview of the central tendencies, dispersion, and distributional characteristics of both the financial performance indicators and ESG scores.

Table 4.1 Descriptive Statistics Table

Variable	Obs	Mean	Std. Dev.	Min	Max
Return on Assets (ROA)	42	.01	.003	.002	.015
Return on Equity (ROE)	42	.118	.04	.021	.233
Tobin's Q	42	1.049	.048	.976	1.155
ESG Combined Score	42	69.255	15.067	35.29	88.57
Environmental Pillar Score	42	72.324	14.572	26.3	89.63

Social Pillar Score	42	72.459	14.755	24.29	91.93
Governance Pillar Score	42	70.001	17.561	19.92	96.82
Bank Size	42	13.181	.369	12.432	13.888
Leverage	42	10.157	1.44	8.308	14.815
GDP Growth	42	4.401	3.064	-5.457	9.032

Source: Developed by own research.

Firstly, we started with the financial performance indicators, the mean Return on Assets (ROA) is 0.010, with a standard deviation of 0.003, indicating that the three DSIBs generated an average return of 1.0 per cent on their total assets over the study period. The minimum and maximum values of 0.002 and 0.015 show that asset efficiency varies only slightly between bank, which is aligned with the competitive oligopolistic structure of the Malaysian banking market. The mean Return on Equity (ROE) of 0.118 with a standard deviation of 0.04 is broadly consistent with the profitability levels documented for emerging-market commercial banks (Shakil et al., 2019). The mean Tobin's Q of 1.049 with a standard deviation of 0.048 suggests that markets value the three DSIBs slightly above their book asset values on average, implying modest intangible value premiums consistent with findings reported for banking sectors in Asian emerging markets by Rahat and Nguyen (2024). The narrow range of Tobin's Q (0.976 to 1.155) also reflecting that the relatively stable market positioning of DSIBs.

When we come to ESG performance, the mean ESG combined score of 69.255 (standard deviation of 15.067) indicates that Malaysian DSIBs exhibit relatively strong aggregate sustainability performance on the LSEG Workspace scoring framework, which ranges from 0 to 100. The wide range of ESG combined scores (35.29 to 88.57) suggests considerable temporal variation within individual banks as their sustainability frameworks matured over the 2010 to 2024 period, particularly following the introduction of mandatory ESG disclosure requirements by Bursa Malaysia and Bank Negara Malaysia's Climate Change and Principle-Based Taxonomy (CCPT) in 2021. The environmental, social and governance pillar scores display mean values of 72.324, 72.459, and 70.001 respectively. The governance pillar exhibits the highest standard deviation (17.561) among all three pillars, indicating that the considerable variation in governance practices across the three banks over time. The social pillar has the highest mean score (72.459) but a

minimum of 24.29, suggesting periods of weaker social performance in the earlier study years when there were less established in structured social disclosure.

For the control variables, the mean bank size (natural logarithm of total assets) is 13.181 with a standard deviation of 0.369, reflecting that all three DSIBs, while differing in absolute scale and operate within a broadly comparable size range. The mean leverage ratio of 10.157 (total debt to total equity) with a standard deviation of 1.440 is indicative of the highly leveraged nature of commercial banking operations, characteristic of deposit-taking institutions. The mean GDP growth rate of 4.401 per cent with a standard deviation of 3.064 summarized the full economic cycle across the study period.

4.2 Pre-Estimation Tests

4.2.1 Correlation Matrix

Table 4.2.1 presents the correlation matrix for all variables in the study. This analysis serves as identifies the preliminary bivariate relationships between the key variables of interest and flags potential multicollinearity concerns that could affect the reliability of the regression estimates (O'Brien, 2007).

Table 4.2.1 Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) ROA	1.000									
(2) ROE	0.892*	1.000								
(3) TOBQ	0.824*	0.874*	1.000							
(4) ESG	-	-	-0.766*	1.000						
	0.562*	0.759*								
(5) ENV	-	-	-0.545*	0.657*	1.000					
	0.472*	0.723*								
(6) SOC	-	-	-0.491*	0.313*	0.502*	1.000				
	0.564*	0.525*								

(7) GOV	-	-	-0.566*	0.511*	0.616*	0.561*	1.000			
	0.514*	0.683*								
(8) SIZE	-	-	-0.738*	0.833*	0.564*	0.364*	0.576*	1.000		
	0.553*	0.661*								
(9) LEV	0.256	0.658*	0.541*	-0.700*	-0.756*	-0.226	-0.610*	-0.511*	1.000	
(10) GDP	0.329*	0.329*	0.190	-0.199	-0.190	-0.061	-0.275	-0.114	0.215	1.000

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Note. Abbreviations: (1) ROA = Return on Assets; (2) ROE = Return on Equity; (3) TobQ = Tobin's Q; (4) ESG = ESG Combined Score; (5) ENV = Environmental Pillar; (6) SOC = Social Pillar; (7) GOV = Governance Pillar; (8) SIZE = Bank Size; (9) LEV = Leverage; (10) GDP = GDP Growth.

All the three financial performance indicators, ROA, ROE and Tobin's Q are exhibit strong positive inter-correlations ranging from 0.824 to 0.892, all statistically significant. Importantly, the ESG combined score is negatively and significantly correlated with all three performance measures by ROA ($r = -0.562$), ROE ($r = -0.759$) and Tobin's Q ($r = -0.766$). Each of the three individual pillar scores similarly displays a negative and statistically significant correlation with all financial performance variables. These preliminary findings already suggest that it is contrary to the study hypotheses, higher ESG performance is associated with lower financial outcomes among Malaysian DSIBs. However, it is important to note that correlations do not control for confounding variables, the panel regression analyses in Section 4.3 will provide a more rigorous assessment. The high positive correlation between the ESG combined score and bank size ($r = 0.833$) reinforces the VIF finding discussed in Section 4.2.2 and warrants careful interpretation of coefficients when both variables are included in the same regression model.

4.2.2 Variance Inflation Factor (VIF)

Prior to estimating the panel regression models, Variance Inflation Factor (VIF) tests were conducted for all variables in both Model 1 and Model 2 to assess whether multicollinearity among the regressors poses a threat to the reliability of the coefficient estimates. Following the convention established

by O'Brien (2007), a VIF threshold of 10 is applied, below which multicollinearity is considered non-problematic. Table 4.2.2 presents the computed VIF values for both models.

Table 4.2.2 Variance Inflation Factor (VIF) Results

Model 1 — ESG Combined Score		
Variable	VIF	1/VIF
ESG Combined Score	4.968	0.201
Bank Size	3.410	0.293
Leverage	2.048	0.488
GDP Growth Rate	1.060	0.943
Mean VIF	2.872	
Model 2 — ESG Pillar Scores		
Variable	VIF	1/VIF
Environmental Pillar Score	3.336	0.300
Leverage	3.084	0.324
Governance Pillar Score	2.611	0.383
Social Pillar Score	1.905	0.525
Bank Size	1.689	0.592
GDP Growth Rate	1.107	0.904
Mean VIF	2.289	

Note. VIF = Variance Inflation Factor; 1/VIF = Tolerance. A VIF value exceeding 10 indicates problematic multicollinearity. All variables are as defined in Table 4.1.

All variables are as defined in Table 4.1. As presented in Table 4.2.2, all VIF values in both models are well below the threshold of 10. In Model 1, the ESG combined score records the highest VIF of 4.968, followed by bank size at 3.410, with a mean VIF of 2.872. In Model 2, the highest VIF belongs to the environmental pillar score at 3.336, with a mean VIF of 2.289. These values indicating that our models are free from serious multicollinearity issues. The slightly higher VIF for the ESG score in Model 1 makes perfect sense, as it is strongly correlated with bank size ($r = 0.833$). Essentially, larger banks tend to have the resources to secure better ESG scores, which is a trend that aligns perfectly with the resource-availability hypothesis (Drempetic et al., 2019). Nevertheless, the absence of any VIF value approaching the critical threshold of 10 confirms that multicollinearity does not compromise the precision of the regression coefficient estimates in either model.

4.2.3 Hausman Specification Test

To select between the Fixed-Effects (FE) and Random-Effects (RE) estimators for all of the six regression equations, the Hausman (1978) specification test was applied after estimating both models for every equation. Under the null hypothesis, the individual bank-specific effects are uncorrelated with the explanatory variables, showing that the RE estimator is consistent and efficient. Rejection of the null hypothesis indicates systematic correlation between the bank-specific effects and the regressors, making the use of the FE estimator become necessary, which remains consistent in the presence of such correlation (Hausman, 1978).

As referred to, the Hausman test results as reported at the bottom of Tables 4.3.1 and 4.3.2 are clear. Across all six equations, ROA, ROE and Tobin's Q under both Model 1 and Model 2, the Hausman chi-squared statistics are large and the associated p-values are uniformly below 0.05 (all $p < 0.002$). Specifically, for Model 1, the chi-squared statistics are 14.41 ($p = 0.0007$),

13.24 ($p = 0.0013$) and 23.79 ($p < 0.0001$) for ROA, ROE and Tobin's Q respectively. For Model 2, the corresponding statistics are 14.04 ($p = 0.0009$), 13.01 ($p = 0.0015$) and 21.92 ($p < 0.0001$). These strongly significant results consistently reject the null hypothesis and confirm that unobserved bank-specific effects are systematically correlated with the ESG and control variables across all equations. Accordingly, the Fixed-Effects estimator is the Hausman-selected and statistically appropriate model for all six equations in both models. This finding is consistent with the expectation that Maybank, CIMB Group Holdings and Public Bank because they have their own deep-rooted, unchanging characteristics, such as their founding history, ownership structure, and unique corporate culture, which can directly influence both their approach to ESG and their financial success. Therefore, we rely primarily on the Fixed Effects (FE) model for all our main discussions, hypothesis tests, and robustness checks. However, RE results are reported alongside FE for transparency and comparability

4.3 Results and Discussions

4.3.1 Model 1: Overall ESG Score and Financial Performance

Referred to Table 4.3.1 presents the panel regression results for Model 1, which examines the relationship between the overall ESG combined score and each of the three financial performance measures, ROA, ROE and Tobin's Q alongside with controlling for bank size, leverage and GDP growth. As established in Section 4.2.3, the FE estimator is the Hausman-selected model for all three equations and serves as the primary basis for hypothesis testing and interpretation.

Table 4.3.1 Panel Regression Result -- Model 1: Overall ESG Score and Financial Performance

	ROA	ROE	Tobin'sQ
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Variable	FE	RE	FE	RE	FE	RE
ESG Combined Score	-0.0000 (-0.481)	-0.0001* (-1.755)	-0.0004 (-0.695)	-0.0011* (-1.817)	0.0000 (0.006)	-0.0014* (-1.907)
Bank Size	-0.0024 (-1.195)	-0.0019 (-1.131)	-0.0175 (-0.741)	-0.0199 (-1.013)	-0.0800*** (-3.731)	-0.0448* (-1.868)
Leverage	-0.0002 (-0.745)	-0.0005 (-1.535)	0.0108*** (3.006)	0.0069* (1.774)	0.0046 (1.425)	0.0017 (0.353)
GDP Growth	0.0003*** (2.870)	0.0002** (2.048)	0.0026** (2.404)	0.0023* (1.738)	0.0014 (1.400)	0.0008 (0.522)
Constant	0.0446* (1.758)	0.0464** (2.334)	0.2521 (0.844)	0.3731 (1.634)	2.0500*** (7.545)	1.7134*** (6.147)
Observations	42	42	42	42	42	42
R-squared	0.318		0.644		0.698	
Number of Banks	3	3	3	3	3	3
Hausman chi ²	14.41		13.24		23.79	
Hausman p-value	0.0007		0.0013		<0.0001	

Note. FE = Fixed-Effects estimator; RE = Random-Effects estimator. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Dependent variables: ROA = Return on Assets; ROE = Return on Equity; Tobin's Q = (Market Capitalisation + Book Value of Total Liabilities) / Total Assets. ESG Combined Score measured on a 0 to 100 scale from LSEG Workspace. Bank Size = $\ln(\text{Total Assets})$. Leverage = Total Debt / Total Equity. GDP Growth = Annual real GDP growth rate (%). N = 42; Banks = 3.

Under the Hausman-selected FE estimator, the coefficient on the ESG combined score is statistically insignificant across all three dependent variables: ROA ($\beta = -0.0000$, $t = -0.481$), ROE ($\beta = -0.0004$, $t = -0.695$) and Tobin's Q ($\beta = 0.0000$, $t = 0.006$). The failure of the overall ESG combined score to achieve statistical significance under the FE specification means that after controlling for the unique, unchanging characteristics of each individual bank, simply improving ESG performance year over year doesn't automatically lead to better profitability or a higher market valuation for Malaysian DSIBs. Because of this, Hypotheses H1a, H2a and H3a, which predicted that higher overall ESG scores would boost financial performance are not supported by the data.

This null finding under FE is econometrically important to interpret carefully. The FE estimator identifies the ESG coefficient solely from within bank and year-to-year variation in ESG scores, which is a stringent test when only three cross-sectional units are observed. Because of Maybank, CIMB and Public Bank have very distinct approaches to ESG, most of the variation

in the data naturally exists between these institutions. However, the Fixed Effects model intentionally absorbs these underlying differences, which had already filtering them out of the final equation. The residual within-bank variation in ESG scores available for identification is therefore limited, particularly in the later years of the sample where ESG scores across all three banks converge towards higher values following the CCPT mandate by Bank Negara Malaysia. This is a well-recognised limitation of the within-estimator in small sample size panels (Azmi et al., 2020). Consequently, the null finding should be interpreted as evidence that marginal changes in ESG performance within individual banks do not yield immediate, no immediate profitability improvements at the moment, rather than as conclusive evidence that ESG is irrelevant to Malaysian DSIB performance across institutions.

The RE results, which capture both within and between bank variation, also reveal negative and marginally significant coefficients for the ESG combined score on ROA ($\beta = -0.0001$, $t = -1.755$, $p < 0.10$), ROE ($\beta = -0.0011$, $t = -1.817$, $p < 0.10$), and Tobin's Q ($\beta = -0.0014$, $t = -1.907$, $p < 0.10$). While the RE estimator is not selected by the Hausman test, these negative relationship between banks are consistent with the correlations in Table 4.3 and suggest that the bank with the highest average ESG scores over the sample period does not necessarily achieve the best financial performance. This finding that aligns with a research provide the view that higher ESG scores among Malaysian DSIBs partly reflect higher compliance and reporting costs rather than genuine performance differentials (Nollet et al., 2015; Atan et al., 2018).

A explanation for the absence of a positive ESG-performance relationship within Model 1 is that Malaysian DSIBs have being subject to escalating regulatory requirements under BNM's CCPT framework and Bursa Malaysia's mandatory sustainability reporting regime. They are incurring substantial upfront ESG-related expenditures such as encompassing climate risk modelling infrastructure, sustainability reporting systems and green finance product development, these investments take years to pay off, creating a natural mismatch with the year-to-year timeframe of this study.

This temporal misalignment between ESG investment outflows and observable financial returns is well-documented in the corporate sustainability literature. Surroca et al. (2009) demonstrate that the ESG-financial performance relationship is mediated by intangible resources and operates over extended periods. Nollet et al. (2015) further show that the ESG-financial performance nexus is non-linear, with moderate engagement potentially generating net negative returns before a performance tipping point is reached in a large multi-industry study. Given that Malaysian DSIBs are in an active phase of ESG integration, data is likely capturing these banks right in the middle of this expensive transition period, rather than the long-term, value-creation phase predicted by stakeholder theory.

Regarding the control variables in Model 1, bank size employed a consistently negative and statistically significant influence on Tobin's Q under the FE estimator ($\beta = -0.0800$, $p < 0.01$). This finding suggests that larger DSIBs attract lower market valuation ratios relative to their book asset values. This aligns with the 'regulatory discount hypothesis' because these banks are so massive and systemically important, they are burdened with heavier compliance costs, stricter capital requirements and stronger regulatory oversight that ultimately constrain their market value (Laeven et al., 2015). Goddard et al. (2004) similarly document a negative size-profitability relationship for large European banks attributable to diseconomies of scale and regulatory compliance costs. GDP growth is a positive and statistically significant determinant of both ROA (FE: $\beta = 0.0003$, $p < 0.01$) and ROE (FE: $\beta = 0.0026$, $p < 0.05$), confirming the bank profitability have positive relationship with macroeconomic conditions (Kwan, 2001). Leverage and bank size do not achieve significance for ROA and ROE under FE in Model 1, suggesting that adjustment in capital structure are not the primary drivers of year-to-year profitability variation for DSIBs.

4.3.2 Model 2: ESG Pillar Scores and Financial Performance

Table 4.3.2 presents the regression results for Model 2, which separating the overall ESG combined score into its environmental, social and governance pillar scores. This decomposition is motivated by the theoretical expectation, grounded by the literature reviewed in Chapter 2, that individual ESG dimensions operate through distinct channels and may exert diversified influences on financial performance. The FE estimator, confirmed as appropriate by the Hausman test across all three equations with chi-squared of 14.04, 13.01 and 21.92 for ROA, ROE and Tobin's Q respectively (all $p < 0.002$) provides the primary basis for inference.

Table 4.3.2 Panel Regression Results -- Model 2: ESG Pillar Scores and Financial Performance

Variable	ROA		ROE		Tobin's Q	
	FE	RE	FE	RE	FE	RE
Environmental Pillar Score	-0.0001* (-2.032)	-0.0000 (-0.932)	-0.0009** (-2.231)	-0.0006 (-1.208)	-0.0001 (-0.145)	0.0005 (0.805)
Social Pillar Score	-0.0000 (-0.597)	-0.0001** (-2.077)	-0.0001 (-0.180)	-0.0006 (-1.621)	-0.0002 (-0.518)	-0.0010** (-2.278)
Governance Pillar Score	-0.0000 (-0.830)	-0.0000 (-0.432)	-0.0003 (-0.872)	-0.0002 (-0.683)	0.0000 (0.011)	0.0002 (0.386)
Bank Size	-0.0034** (-2.309)	-0.0029*** (-2.617)	-0.0324* (-1.861)	-0.0310** (-2.412)	-0.0799*** (-4.552)	-0.0742*** (-4.407)
Leverage	-0.0009** (-2.073)	-0.0005 (-1.336)	0.0029 (0.569)	0.0060 (1.347)	0.0040 (0.779)	0.0101* (1.738)
GDP Growth	0.0002** (2.709)	0.0002** (2.206)	0.0023** (2.201)	0.0022* (1.788)	0.0014 (1.294)	0.0013 (0.803)
Constant	0.0703** (3.063)	0.0607*** (4.079)	0.5929** (2.166)	0.5527*** (3.189)	2.0710*** (7.504)	1.9452*** (8.586)
Observations	42	42	42	42	42	42
R-squared	0.468		0.715		0.703	
Number of Banks	3	3	3	3	3	3
Hausman chi ²	14.04		13.01		21.92	
Hausman p-value	0.0009		0.0015		<0.0001	

Note. FE = Fixed-Effects estimator; RE = Random-Effects estimator. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Dependent variables as defined in Table 4.4. Environmental, Social and Governance Pillar Scores are measured on a 0 to 100 scale from LSEG Workspace. Control variables as defined in Table 4.4. $N = 42$; Banks = 3.

Under the FE estimator, the environmental pillar score is the only ESG dimension that achieves statistical significance in Model 2. It showed a negative and significant influence on ROA ($\beta = -0.0001$, $t = -2.032$, $p < 0.10$) and ROE ($\beta = -0.0009$, $t = -2.231$, $p < 0.05$), while its coefficient on Tobin's Q is statistically insignificant ($\beta = -0.0001$, $t = -0.145$). The social pillar and governance pillar scores do not reach statistical significance under the FE estimator for any of the three dependent variables. These results collectively indicating that none of the 12 study hypotheses are empirically supported. Hypotheses H2b and H3b, which indicated there are positive relationship between environmental pillar score with ROA and ROE are specifically contradicted by a significant negative finding, while all remaining hypotheses fail to achieve statistical significance in the predicted positive direction.

The negative relationship between the environmental pillar score and accounting-based performance need detailed examination. The LSEG Workspace environmental pillar score captures a bank's management of greenhouse-gas emissions, energy efficiency, resource consumption and the environmental characteristics of its lending and investment portfolios (Fu & Li, 2023). For Malaysian DSIBs, improvements in environmental performance scores are predominantly achieved through substantial investments in climate risk assessment infrastructure, green bond issuance frameworks, loan portfolio environmental screening systems and mandatory CCPT compliance reporting. All of this represent significant cost centres in the short-to-medium term. Weber et al. (2008) note that while environmental screening of banking portfolios reduces long-run credit losses by limiting exposure to high-emission borrowers, the compliance infrastructure imposes near-term transitional costs that compress profitability during the transition period. D'Orazio (2025) further highlights that the financial benefits of environmental policies in banking, including reduced credit risk and improved liquidity resilience required over extended periods encompassing multiple business cycles, rather than within the one-year

measurement window of annual profitability metrics. In a study of Asian banking institutions, Wu and Shen (2013) found that environmental CSR activities are associated with lower short-term profitability in markets where investor recognition of ESG value remains growing. This is a situation that closely describes Malaysia during the 2010 to 2024 period, particularly in the first decade of the sample before the EPF adopted United Nations-supported Principles for Responsible Investment in 2019 and before the CCPT was introduced in 2021.

The absence of a statistically significant relationship between governance and financial performance in the FE specification is noteworthy given the consistent positive evidence reported in the literature. Korzeb et al. (2024), analysing 303 commercial banks across 61 countries, found that governance quality directly reduces default risk. Fakhrunnas et al. (2025) further validate that the governance pillar enhances banking performance even during crisis periods. The null governance finding in the present study is most possibly explained by a ceiling effect, which Malaysian DSIBs, due to their systemically important designation, are already required by BNM to maintain high baseline governance standards, including enhanced board independence mandates, executive remuneration disclosure requirements and comprehensive internal audit frameworks. When all three banks already occupy the higher standard of the governance quality distribution, the marginal financial returns from incremental within bank governance improvements may be too small to generate detectable differences in annual profitability ratios. This interpretation aligns with Barnett and Salomon (2012), who demonstrate that financial returns to CSR activities are contingent on the prior level of engagement, with advanced-stage adopters experiencing diminishing marginal returns.

The social pillar showed insignificance under the FE estimator for all three performance measures is consistent with the theoretical characterisation of social investments, such as employee welfare or community engagement, which tend to generate broad, long-term goodwill but difficult to capture in short-term accounting figures or immediate market valuations (Ioannou & Serafeim, 2012). Rizki and Putra (2024), examining ASEAN-5 banking

sectors, found that the social pillar's impact on profitability varies considerably across countries depending on institutional conditions, with weaker effects observed in markets where social expenditure is not yet differentiated as a competitive advantage by institutional investors. This finding is directly applicable to the Malaysian context, where large institutional investors still increasingly adopting ESG filters following EPF's PRI commitment in 2019. Now, investors still lack the systematic tools needed to confidently price a bank's social initiatives as a distinct driver of its stock value.

Regarding the control variables in Model 2, bank size retains its negative and highly significant influence on Tobin's Q under both FE ($\beta = -0.0799$, $p < 0.01$) and RE ($\beta = -0.0742$, $p < 0.01$) estimators, and additionally becomes a significant negative determinant of ROA (FE: $\beta = -0.0034$, $p < 0.05$) and ROE (FE: $\beta = -0.0324$, $p < 0.10$), which the relationships that were not significant in Model 1. This strengthening of the size effect in Model 2 may reflect that the ESG pillar decomposition is more precisely isolates the regulatory cost burden of larger DSIBs that was previously partially absorbed by the high correlation between the ESG combined score and bank size. Leverage is negative and significant for ROA under FE ($\beta = -0.0009$, $p < 0.05$), which indicating that higher leverage ratios compress asset efficiency for these institutions, consistent with the risk-return trade-off characterising highly leveraged banking balance sheets (Shakil et al., 2019). GDP growth continues to positively and significantly influence ROA (FE: $\beta = 0.0002$, $p < 0.05$) and ROE (FE: $\beta = 0.0023$, $p < 0.05$), confirming the procyclical earnings pattern of Malaysian DSIBs.

4.4 Robustness Check

4.4.1 Robustness Test 1: One-Year Lagged ESG Scores

Tables 4.4.1.1 and 4.4.1.2 present the results of the first robustness test, which all ESG independent variables are replaced with one-year lagged counterparts. This specification is motivated by two considerations: the theoretical expectation that ESG investments require time to translate into observable financial outcomes (Weber et al., 2008) and the econometric objective of mitigating potential reverse causality concerns, as a lagged ESG score in year $t-1$ cannot be influenced by financial performance outcomes measured in year t (Rahat & Nguyen, 2024). The Hausman test results continue to reject the null across all three equations in both lagged models with chi-squared values of 18.66, 18.52 and 24.52 for Model, 115.29, 15.26 and 22.85 for Model 2 plus all $p < 0.001$, confirming that FE remains the appropriate estimator in this sub-sample of 39 observations.

Table 4.4.1.1 Panel Regression Results -- Robustness Test 1A: One-Year Lagged Overall ESG Score

Variable	ROA		ROE		Tobin's Q	
	FE	RE	FE	RE	FE	RE
ESG Combined (t-1)	0.0000 (0.799)	-0.0001 (-1.225)	0.0003 (0.745)	-0.0006 (-1.231)	-0.0002 (-0.401)	-0.0016** (-2.312)
Bank Size	-0.0042** (-2.154)	-0.0023 (-1.316)	-0.0442** (-2.042)	-0.0258 (-1.328)	-0.0614** (-2.735)	-0.0351 (-1.365)
Leverage	0.0000 (0.023)	-0.0003 (-0.909)	0.0132*** (4.293)	0.0094** (2.384)	0.0088*** (2.774)	0.0029 (0.555)
GDP Growth	0.0003*** (3.539)	0.0002** (2.114)	0.0028*** (3.244)	0.0024* (1.925)	0.0011 (1.236)	0.0005 (0.286)
Constant	0.0632** (2.509)	0.0475** (2.275)	0.5345* (1.933)	0.3953* (1.734)	1.7755*** (6.188)	1.5871*** (5.253)
Observations	39	39	39	39	39	39
R-squared	0.415		0.726		0.726	

Number of Banks	3	3	3	3	3	3
Hausman chi ²	18.66		18.52		24.52	
Hausman p-value	<0.0001		<0.0001		<0.0001	

Note. FE = Fixed-Effects; RE = Random-Effects. *** p < 0.01, ** p < 0.05, * p < 0.10. ESG Combined (t-1) = one-year lagged ESG combined score. Control variables measured at time t. N = 39; Banks = 3. Hausman chi² and p-values confirm FE selection across all three equations.

Table 4.4.1.2 Panel Regression Result -- Robustness Test 1B: One-Year Lagged ESG Pillar Scores

Variable	ROA		ROE		Tobin's Q	
	FE	RE	FE	RE	FE	RE
Environmental Pillar (t-1)	-0.0000 (-0.911)	-0.0001 (-1.155)	-0.0005 (-1.076)	-0.0008 (-1.275)	-0.0002 (-0.342)	-0.0007 (-0.743)
Social Pillar (t-1)	-0.0000 (-1.038)	-0.0001** (-2.429)	-0.0002 (-0.869)	-0.0008** (-2.277)	-0.0003 (-0.964)	-0.0012** (-2.456)
Governance Pillar (t-1)	-0.0000 (-0.743)	-0.0000 (-0.590)	-0.0002 (-0.652)	-0.0002 (-0.597)	0.0002 (0.733)	0.0001 (0.206)
Bank Size	-0.0026 (-1.594)	-0.0017 (-1.175)	-0.0256 (-1.431)	-0.0181 (-1.151)	-0.0603*** (-3.194)	-0.0573** (-2.546)
Leverage	-0.0006 (-1.292)	-0.0009 (-1.560)	0.0058 (1.043)	0.0022 (0.332)	0.0090 (1.548)	0.0010 (0.104)
GDP Growth	0.0003*** (3.283)	0.0002** (2.345)	0.0026*** (3.035)	0.0025** (2.148)	0.0012 (1.361)	0.0009 (0.562)
Constant	0.0559** (2.531)	0.0523*** (3.393)	0.4519* (1.855)	0.4513*** (2.656)	1.7673*** (6.858)	1.9213*** (7.900)
Observations	39	39	39	39	39	39
R-squared	0.461		0.745		0.735	
Number of Banks	3	3	3	3	3	3
Hausman chi ²	15.29		15.26		22.85	
Hausman p-value	0.0005		0.0005		<0.0001	

Note. FE = Fixed-Effects (Hausman-selected); RE = Random-Effects. *** p < 0.01, ** p < 0.05, * p < 0.10. (t-1) = one-year lagged pillar scores. Control variables measured at time t. N = 39; Banks = 3. Hausman chi² and p-values confirm FE selection across all three equations.

Under the lagged overall ESG specification as results referred to Table 4.4.1.1, the coefficient on the lagged ESG combined score remains statistically insignificant under the FE estimator for all three dependent variables: ROA ($\beta = 0.0000$, $t = 0.799$), ROE ($\beta = 0.0003$, $t = 0.745$) and

Tobin's Q ($\beta = -0.0002$, $t = -0.401$). This is fully consistent with the main Model 1 FE result, confirming that neither existing nor lagged overall ESG performance generates significant improvements in financial performance. Bank size retains its significantly negative FE association with Tobin's Q ($\beta = -0.0614$, $p < 0.05$) and becomes significantly negative for ROA ($\beta = -0.0042$, $p < 0.05$) and ROE ($\beta = -0.0442$, $p < 0.05$) in this lagged specification, which suggesting that the size effect is more pronounced when performance is measured against prior year ESG conditions. GDP growth continues to positively and significantly drive ROA and ROE under FE. The RE estimator additionally shows a negative and significant lagged ESG coefficient for Tobin's Q ($\beta = -0.0016$, $p < 0.05$), consistent with the main RE result ($\beta = -0.0014$, $p < 0.10$), though this specification is not Hausman-selected.

Under the lagged ESG pillar panel regression result (Table 4.4.1.2), the FE estimator showed insignificant coefficients for all three lagged pillar scores across all three dependent variables. This is a notable shift from the main Model 2 FE result, where current year environmental scores had a distinctly negative impact on both ROA and ROE. The loss of significance for the lagged environmental pillar under FE suggests that the financial burden is in short-term and immediate, which driven directly by current year compliance costs. Essentially, the heavy upfront expenses of meeting environmental standards reduced earnings right away and the anticipated long-term benefits, such as improved asset quality or fewer credit losses do not materialize quickly enough to offset those costs within the same annual reporting period. These results provide important nuance, implying that the negative impact of environmental pillar on accounting-based profitability is not a long-term drag, but a short-term cost pressure in the year of the increase in environmental compliance. Under the RE estimator, which not Hausman-selected but reported for reference, the lagged social pillar score reported as negative and significant for ROA ($\beta = -0.0001$, $p < 0.05$), ROE ($\beta = -0.0008$, $p < 0.05$) and Tobin's Q ($\beta = -0.0012$, $p < 0.05$), consistent with the cross-sectional between-bank dimension of the relationship

between social pillar and financial performance relationship persisting across time lags.

4.4.2 Robustness Test 2: Exclusion of COVID-19 Years (2020–2021)

Tables 4.4.2.1 and 4.4.2.2 present the results after excluding the COVID-19 pandemic years of 2020 and 2021, reducing the sample to 36 observations. This test verifies that the main findings are not driven by the extraordinary macroeconomic disruptions of the pandemic period, including regulatory breaks, massive loan pauses, heightened credit-risk provisioning and potential disruptions to ESG data collection and scoring processes (Rizwan et al., 2020). The Hausman test continues to confirm FE as the appropriate estimator across all equations in this sub-sample (all $p < 0.003$), consistent with the main analysis.

Table 4.4.2.1 Robustness Test 2A: Excluding COVID-19 Years (2020–2021) — Overall ESG Score

Variable	ROA		ROE		Tobin's Q	
	FE	RE	FE	RE	FE	RE
ESG Combined Score	0.0000 (0.224)	-0.0000 (-0.848)	-0.0000 (-0.029)	-0.0006 (-0.946)	0.0001 (0.193)	-0.0010 (-1.318)
Bank Size	-0.0025 (-1.289)	-0.0028 (-1.556)	-0.0188 (-0.812)	-0.0293 (-1.401)	-0.0800*** (-3.367)	-0.0480* (-1.769)
Leverage	-0.0000 (-0.076)	-0.0003 (-0.795)	0.0131*** (3.649)	0.0097** (2.457)	0.0053 (1.427)	0.0044 (0.862)
GDP Growth	-0.0002 (-0.764)	-0.0001 (-0.450)	-0.0018 (-0.715)	-0.0013 (-0.422)	0.0005 (0.193)	0.0010 (0.254)
Constant	0.0439* (1.797)	0.0538** (2.572)	0.2470 (0.840)	0.4549* (1.859)	2.0426*** (6.767)	1.7041*** (5.363)
Observations	36	36	36	36	36	36

R-squared	0.132		0.619		0.659	
Number of Banks	3	3	3	3	3	3
Hausman chi ²	12.73		11.69		18.92	
Hausman p-value	0.0017		0.0029		<0.0001	

Note. FE = Fixed-Effects (Hausman-selected); RE = Random-Effects. *** p < 0.01, ** p < 0.05, * p < 0.10. Sample excludes observations for 2020 and 2021. N = 36; Banks = 3.

Table 4.4.2.2 Robustness Test 2B: Excluding COVID-19 Years (2020–2021) — ESG Pillar Scores

Variable	ROA		ROE		Tobin's Q	
	FE	RE	FE	RE	FE	RE
Environmental Pillar Score	-0.0001** (-2.202)	-0.0000 (-0.681)	- 0.0010** (-2.435)	-0.0005 (-0.993)	0.0001 (0.111)	0.0009 (1.428)
Social Pillar Score	0.0000 (0.851)	-0.0000 (-1.372)	0.0005 (1.236)	-0.0004 (-0.880)	-0.0002 (-0.449)	-0.0015*** (-2.789)
Governance Pillar Score	-0.0001 (-1.601)	-0.0000 (-0.502)	-0.0008* (-1.741)	-0.0003 (-0.842)	0.0001 (0.203)	0.0007 (1.329)
Bank Size	-0.0034** (-2.244)	-0.0029*** (-2.633)	-0.0340* (-1.895)	-0.0315** (-2.434)	-0.0757*** (-3.625)	-0.0738*** (-4.341)
Leverage	-0.0011** (-2.164)	-0.0004 (-0.890)	-0.0011 (-0.167)	0.0070 (1.401)	0.0060 (0.818)	0.0176*** (2.688)
GDP Growth	-0.0004 (-1.393)	-0.0000 (-0.002)	-0.0052 (-1.598)	-0.0010 (-0.272)	0.0016 (0.420)	0.0078 (1.617)
Constant	0.0763*** (3.010)	0.0591*** (3.846)	0.6961** (2.297)	0.5527*** (3.045)	1.9833*** (5.632)	1.8019*** (7.547)
Observations	36	36	36	36	36	36
R-squared	0.319		0.705		0.662	
Number of Banks	3	3	3	3	3	3
Hausman chi ²	12.01		11.61		15.42	
Hausman p-value	0.0025		0.0030		0.0004	

Note. FE = Fixed-Effects (Hausman-selected); RE = Random-Effects. *** p < 0.01, ** p < 0.05, * p < 0.10. Sample excludes observations for 2020 and 2021. N = 36; Banks = 3.

For the overall ESG model excluding COVID-19 years (Table 4.4.2.1), the ESG combined score remains statistically insignificant under the FE estimator for all three performance measures, which are ROA ($\beta = 0.0000$, $t = 0.224$), ROE ($\beta = -0.0000$, $t = -0.029$) and Tobin's Q ($\beta = 0.0001$, $t =$

0.193), it fully confirming the main Model 1 FE findings. The significance of GDP growth disappears in this sub-sample for both ROA and ROE, which is attributable to the removal of the -5.457% GDP growth observation of 2020, which generated the most extreme annual variation in the full dataset and contributed substantially to the explanatory power of the GDP growth control in the main analysis. The persistence of the bank size negative effect on Tobin's Q ($\beta = -0.0800$, $p < 0.01$) across both the full sample and this pandemic excluded sub-sample demonstrates that the regulatory discount for systemically important institutions is a structural and stable feature unrelated to pandemic period changes.

For the ESG pillar model excluding COVID-19 years (Table 4.4.2.2), the most important finding is the continued statistical significance of the environmental pillar score negative relationship with ROA (FE: $\beta = -0.0001$, $p < 0.05$) and ROE (FE: $\beta = -0.0010$, $p < 0.05$). These negative results remained just as strong and actually gained statistical significance after removing the pandemic years, we have compelling proof of a broader trend. It confirms that the heavy financial burden of environmental compliance is a permanent, structural reality for major Malaysian banks, rather than just a temporary anomaly caused by COVID-19.. The removal of 2020 and 2021 eliminates the most extreme macro-driven compression of bank profitability from the dataset and yet the environmental pillar's negative effect on accounting performance endures and strengthens, confirming its robustness. Additionally, in the pandemic excluded sub-sample, the governance pillar score achieves marginal significance for ROE under FE ($\beta = -0.0008$, $t = -1.741$, $p < 0.10$), a result taht is not observed in the main analysis, potentially reflecting that governance compliance expenditures became more visible as a cost burden in the non-pandemic sub-period when earnings were not otherwise affected by extraordinary macro shocks. The social pillar score does not achieve significance under FE in any robustness specification, consistently reinforcing the null relationship finding from the main analysis.

Overall, the two robustness tests collectively confirm the stability and reliability of the main findings. The null relationship between the overall ESG combined score and financial performance under FE is robust across

lagged specifications and pandemic excluded sub-samples. The environmental pillar's significant negative influence on ROA and ROE is confirmed across the pandemic exclusion test and is shown to operate through contemporaneous rather than lagged channels. The Hausman test consistently selects the FE estimator across all robustness sub-samples, reinforcing the validity of the primary model selection decision.

4.5 Summary of Empirical Results

This chapter has presented and extensively discussed the empirical findings from panel regression analyses examining the relationship between ESG scores and the financial performance of Malaysian DSIBs over the 2010 to 2024 period. The pre-estimation tests confirm the absence of multicollinearity problems in both models (all VIF values below 5.0) and unambiguously select the Fixed-Effects estimator as the appropriate specification for all six regression equations across both models (all Hausman p-values below 0.002). These diagnostic foundations underpin the credibility and interpretive validity of the coefficient estimates that follow.

The core empirical findings are as follows. First, the overall ESG combined score does not showed a statistically significant relationship with any of the three financial performance measures under the FE estimator, failing to support Hypotheses H1a, H2a and H3a. This finding suggests that bank's year-to-year changes in aggregate ESG performance have not translated into detectable profitability or market valuation improvements for Malaysian DSIBs during the study period, which is interpreted as reflecting the net compliance cost burden of progressive ESG adoption under BNM's evolving regulatory framework (Nollet et al., 2015; Surroca et al., 2009). Second, the environmental pillar score is the sole ESG dimension achieving statistical significance in the FE specification, displaying a negative relationship with ROA ($p < 0.10$) and ROE ($p < 0.05$), contrary to Hypotheses H2b and H3b. This negative relationship between environmental pillar score and financial performance is robust to the exclusion of COVID-19 years, which is 2020 to 2021 (Robustness Test 2B) and is attributed to the current year

compliance costs of climate risk infrastructure and CCPT-mandated environmental reporting, which compress current year earnings ahead of the long term benefits (Weber et al., 2008; D'Orazio, 2025; Wu & Shen, 2013). Third, neither the social nor governance pillar scores achieve statistical significance under the FE estimator in the main analysis or in either robustness test. The governance null finding is interpreted through the lens of a ceiling effect for DSIBs whose are already highly governed institutions (Barnett & Salomon, 2012), while the social null finding reflects the diffuse and long term nature of social value creation that resists annual financial measurement (Ioannou & Serafeim, 2012; Rizki & Putra, 2024). Fourth, bank size consistently and negatively influences Tobin's Q across all specifications, while GDP growth consistently and positively determines accounting-based profitability, confirming the structural regulatory discount for large institutions and the procyclical earnings pattern of Malaysian DSIBs.

Ultimately, these findings providing a clear, data-driven picture of an emerging market banking sector undergoing a major structural shift. Right now, Malaysian banks are still in this active transition, where need to bear the heavy upfront costs of ESG compliance today because the long-term financial rewards need time to materialize. Chapter 5 will discuss the theoretical contributions of these findings, examine their practical implications for regulators, investors and bank management, acknowledge the limitations of the study, and propose directions for future research.

CHAPTER 5: CONCLUSION AND IMPLICATIONS

5.0 Introduction

The chapter synthesises and contextualises the empirical findings in the wider ESG and banking performance literature. The chapter is organised as follows. Section 5.1 provides a comprehensive summary of the statistical analyses and key findings, including a synthesized review of hypothesis testing outcomes. Section 5.2 discusses the practical implications of the findings for policymakers, investors and bank management. Section 5.3 acknowledges the limitations of the study. Section 5.4 proposes directions for future research. Section 5.5 offers an overall conclusion of the entire research project in alignment with the stated research objectives.

5.1 Summary of Statistical Analyses and Major Findings

This study examined the relationship between ESG scores and the financial performance of three Malaysian DSIBs over a 15 year period from 2010 to 2024, yielding a balanced panel dataset of 42 observations. Panel data analysis was

employed with both FE and RE estimators across six regression equations covering two models. The Hausman specification test was applied to every equation to select the most appropriate estimator. The following subsections summarise the key statistical outputs from each analytical stage.

5.1.1 Descriptive Statistics and Pre-Estimation Tests

The descriptive statistics in Table 4.1 revealed several noteworthy characteristics of the dataset. The three DSIBs generated a mean Return on Assets (ROA) of 1.0% and a mean Return on Equity (ROE) of 11.8% over the study period, similar with the profitability benchmarks documented for emerging-market commercial banks (Shakil et al., 2019). The mean Tobin's Q of 1.049 indicates that financial markets valued that DSIBs slightly above their book asset values, which is typical for systemically important institutions in Asian emerging markets (Rahat & Nguyen, 2024). The mean overall ESG combined score of 69.255 demonstrated that Malaysian DSIBs exhibited relatively strong aggregate sustainability performance over the study period, with the wide range of ESG scores from 35.29 to 88.57, reflecting sustainability frameworks matured over the time after Bank Negara Malaysia introduced the Climate Change and Principle-Based Taxonomy (CCPT) in 2021. Among the three individual ESG pillars, the governance pillar exhibited the highest standard deviation of 17.561, indicating the greatest variation across institutions and over time.

The correlation matrix presented in Table 4.2 confirmed strong positive correlations among the three financial performance indicators, which ranging from 0.824 to 0.892. Notably, all the ESG combined score and each individual pillar score were negatively and significantly correlated with all three financial performance measures, contrary to the study's hypotheses. The high positive correlation between the ESG combined score and bank size ($r = 0.833$) further confirmed that larger institutions tend to achieve higher ESG scores, which aligns with the resource-availability hypothesis reported by Drempetic et al. (2019).

The Variance Inflation Factor (VIF) tests confirmed that both models did not have any multicollinearity issues and all VIF results were less than the critical value of 10. In Model 1, the highest VIF was recorded for the ESG combined score at 4.968, while in Model 2, the environmental pillar score recorded the highest VIF of 3.336. The Hausman specification test rejected the null hypothesis in all six regression equations in both models with chi-squared statistics ranging between 13.01 and 23.79 and all associated p-values below 0.002. This confirmed that the FE estimator is the statistically appropriate model for all equations.

5.1.2 Model 1: Overall ESG Score and Financial Performance

The panel regression results for Model 1, which examined the overall ESG combined score with each of the three financial performance measures while controlling for bank size, leverage and GDP growth are reported in Table 4.4. Under the Hausman-selected FE estimator, the coefficient on the ESG combined score was statistically insignificant across all three dependent variables: ROA ($\beta = -0.0000$, $t = -0.481$), ROE ($\beta = -0.0004$, $t = -0.695$) and Tobin's Q ($\beta = 0.0000$, $t = 0.006$). These null findings indicate that marginal, year-to-year improvements in aggregate ESG performance have not translated into measurable profitability or market valuation gains for Malaysian DSIBs during the study period. Hypotheses H1a, H2a and H3a, which predicted positive relationships between the overall ESG combined score and Tobin's Q, ROA and ROE respectively are therefore not supported by the data.

Among the control variables in Model 1, bank size showed a consistently negative and highly significant relationship with Tobin's Q under the FE estimator ($\beta = -0.0800$, $p < 0.01$), aligning with the regulatory discount hypothesis that mentioned systemically important institutions attract lower market valuation ratios due to heightened capital requirements and compliance costs (Laeven et al., 2015). GDP growth was a positive and statistically significant determinant of both ROA (FE: $\beta = 0.0003$, $p < 0.01$) and ROE (FE: $\beta = 0.0026$, $p < 0.05$), confirming the procyclical earnings

pattern of Malaysian DSIBs and the important role of macroeconomic conditions in driving among the bank profitability (Kwan, 2001).

Under the RE estimator, which is not Hausman-selected but reported for reference in Table 4.4, the ESG combined score displayed negative and marginally significant coefficients for ROA ($\beta = -0.0001$, $p < 0.10$), ROE ($\beta = -0.0011$, $p < 0.10$) and Tobin's Q ($\beta = -0.0014$, $p < 0.10$). These negative associations suggest that the bank with the highest average ESG scores over the sample period does not achieve the best financial performance, consistent with the view that higher ESG scores among Malaysian DSIBs partly raised by compliance and reporting costs rather than genuine financial performance (Nollet et al., 2015; Atan et al., 2018).

5.1.3 Model 2: ESG Pillar Scores and Financial Performance

Model 2 disaggregated the overall ESG combined score into three pillar scores, which are environmental, social and governance pillar scores to examine their individual relationships with financial performance. The FE regression results are reported in Table 4.5, with the Hausman test confirming the FE estimator as appropriate across all three equations, with chi-squared statistics of 14.04, 13.01 and 21.92 for ROA, ROE and Tobin's Q respectively (all $p < 0.002$).

The environmental pillar score was the sole ESG dimension achieving statistical significance under the FE estimator in Model 2. It exhibited a negative and significant influence on ROA ($\beta = -0.0001$, $t = -2.032$, $p < 0.10$) and ROE ($\beta = -0.0009$, $t = -2.231$, $p < 0.05$), while its coefficient on Tobin's Q was statistically insignificant ($\beta = -0.0001$, $t = -0.145$). These findings directly contradict Hypotheses H2b and H3b that predicted positive relationships. The negative relationship is attributed to the substantial upfront compliance costs that support with climate risk infrastructure, green bond frameworks, environmental portfolio screening systems and mandatory CCPT reporting. All of this will compress profitability in the

short-to-medium term ahead of long term benefits (Weber et al., 2008; D'Orazio, 2025).

The social pillar score did not achieve statistical significance under the FE estimator for any of the three dependent variables, failing to support Hypotheses H1c, H2c and H3c. This null result is consistent with the theoretical characterisation of social investments as generating diffuse, long-term goodwill that is difficult to capture in annual accounting metrics or near-term market valuations (Ioannou & Serafeim, 2012). This is similar to Rizki and Putra (2024), who found diversified social pillar effects across ASEAN-5 banking markets, suggesting that the effectiveness of social initiatives in driving bank profitability is random on regional institutional factors that may not yet fully operate in the Malaysian context.

The governance pillar score also did not achieve statistical significance under the FE estimator for any of the three performance measures, failing to support Hypotheses H1d, H2d and H3d. This null result is most likely explained by a ceiling effect specific to the DSIB's regulatory environment. As institutions designated by Bank Negara Malaysia as systemically important, DSIBs are already required to maintain high baseline governance standards, including enhanced board independence mandates, executive remuneration disclosure requirements and comprehensive internal audit frameworks. When all three banks already occupy the higher governance quality distribution, slightly improvements in governance scores insufficient to generate detectable differences in their annual profitability ratios, consistent with the diminishing marginal returns to CSR engagement reported by Barnett and Salomon (2012).

Regarding the control variables in Model 2, bank size retained its negative and highly significant influence on Tobin's Q under both FE ($\beta = -0.0799$, $p < 0.01$) and RE ($\beta = -0.0742$, $p < 0.01$) estimators and additionally became a significant negative determinant of ROA (FE: $\beta = -0.0034$, $p < 0.05$) and ROE (FE: $\beta = -0.0324$, $p < 0.10$). Leverage was negative and significant for ROA under FE ($\beta = -0.0009$, $p < 0.05$), indicating that higher leverage ratios compress asset efficiency for these institutions. GDP growth continued to

positively and significantly influence both ROA (FE: $\beta = 0.0002$, $p < 0.05$) and ROE (FE: $\beta = 0.0023$, $p < 0.05$) confirming the procyclical earnings pattern of Malaysian DSIBs.

5.1.4 Robustness Checks

Two robustness tests were conducted to assess the stability and reliability of the primary findings. The first robustness test replaced all ESG independent variables with one-year lagged counterparts to address the theoretical expectation that ESG investments require time to translate into more observable financial outcomes and to mitigate potential reverse causality concerns (Weber et al., 2008; Rahat & Nguyen, 2024). The Hausman test continued to confirm the FE estimator as appropriate estimator across all equations in this lagged sub-sample of 39 observations, with chi-squared values of 18.66, 18.52 and 24.52 for Model 1 and 15.29, 15.26 and 22.85 for Model 2 (all $p < 0.001$).

Under the lagged overall ESG specification in Table 4.7, the FE coefficient on the lagged ESG combined score remained statistically insignificant for all three dependent variables, fully confirming the main Model 1 null result. Under the lagged ESG pillar specification in Table 4.8, all three lagged pillar scores were also statistically insignificant under the FE estimator for all three performance measures. This is a notable shift from the main Model 2 FE results, where the current year environmental pillar score was significantly negative for ROA and ROE. The disappearance of environmental significance under the lagged specification indicates that the environmental pillar's negative effect on profitability is driven by immediate compliance costs, rather than a sustained, multi-period drag.

The second robustness test excluded the COVID-19 pandemic years of 2020 and 2021, reducing the sample to 36 observations. As reported in Tables 4.9 and 4.10, the Hausman test continued to confirm FE as the appropriate estimator across all equations (all $p < 0.003$). The ESG combined score remained statistically insignificant for all three performance measures in the

pandemic excluded sub-sample for Model 1 (Table 4.9), fully confirming the main finding. Importantly, for Model 2 excluding COVID-19 years (Table 4.10), the environmental pillar score retained and indeed strengthened its significant negative relationship with ROA (FE: $\beta = -0.0001$, $p < 0.05$) and ROE (FE: $\beta = -0.0010$, $p < 0.05$). This confirms that the environmental pillar's negative effect on accounting-based profitability represents a structural and persistent characteristic of Malaysian DSIB financial performance during the ESG transition period, rather than affected by pandemic. The governance pillar score attained marginal significance for ROE under FE in this sub-sample ($\beta = -0.0008$, $t = -1.741$, $p < 0.10$), suggesting that governance compliance costs may become more visible as a cost burden outside of unusual macroeconomic shock periods.

5.1.5 Summary of Hypothesis Testing

Table 5.1 provides a consolidated summary of the hypothesis testing outcomes across all 12 hypotheses examined in this study. Overall, none of the 12 hypotheses are empirically supported in the predicted positive direction under the Hausman-selected FE estimator. Two hypotheses, H2b and H3b, are specifically contradicted by statistically significant negative findings for the environmental pillar score. The remaining ten hypotheses fail to achieve statistical significance in either direction.

Table 5.1: Summary of Hypothesis Testing Results

Hypothesis	Direction	Significance	Outcome
H1a: Overall ESG → Tobin's Q	Positive	Not significant	Not Supported
H1b: Environmental → Tobin's Q	Positive	Not significant	Not Supported
H1c: Social → Tobin's Q	Positive	Not significant	Not Supported

H1d: Governance → Tobin's Q	Positive	Not significant	Not Supported
H2a: Overall ESG → ROA	Positive	Not significant	Not Supported
H2b: Environmental → ROA	Positive	$p < 0.10 (-)$	Contradicted
H2c: Social → ROA	Positive	Not significant	Not Supported
H2d: Governance → ROA	Positive	Not significant	Not Supported
H3a: Overall ESG → ROE	Positive	Not significant	Not Supported
H3b: Environmental → ROE	Positive	$p < 0.05 (-)$	Contradicted
H3c: Social → ROE	Positive	Not significant	Not Supported
H3d: Governance → ROE	Positive	Not significant	Not Supported

Source: Developed by own research.

5.2 Implications of the Study

The practical implications of the empirical findings of this research are important to three main stakeholder groups. The following subsections discuss these implications sequentially for regulatory authorities, institutional investors and bank management.

5.2.1 Implications for Regulatory Authorities

For regulatory authorities, especially Bank Negara Malaysia (BNM) and Bursa Malaysia, the results offer a valuable insight into the short-term financial implication of increasing ESG requirements on DSIBs. The

significant negative relationship between the environmental pillar score and accounting-based profitability, which remained and strengthened after removing the COVID-19 years, indicates that the CCPT framework and mandatory sustainability reporting regime are causing measurable transition costs to DSIBs in the current period. Therefore, regulators should carefully consider the design and timing of ESG compliance requirements, balancing the long-term stability benefits of climate risk management against the short term profitability compression that related to the transition period. Eccles et al. (2014) proved that while the financial benefits of corporate sustainability are real, they take over extended time horizons spanning multiple years, which implies that regulators may need to provide transitional relief mechanisms or tolerance in compliance to allow DSIBs to absorb initial ESG investment costs without compromising their financial stability.

Furthermore, policymakers should consider incentivising voluntary ESG disclosures beyond minimum requirements. Fatemi et al. (2017) provide evidence that the value-relevance of ESG performance is significantly moderated by the quality and depth of ESG disclosure, suggesting that disclosure depth amplifies any positive financial signals related with actual sustainability improvements. Encouraging DSIBs to adopt internationally recognised disclosure frameworks, such as those recommended by the Task Force on Climate-related Financial Disclosures (TCFD) may shorten the timeline over which ESG investments translate into measurable market valuation improvements (Tumewang et al., 2025). For Securities Commission Malaysia, the null relationship between governance scores and performance reinforces the existing high baseline governance standards required of DSIBs, suggesting that any further incremental governance requirements may generate diminishing marginal returns for these institutions unless they address the governance risks such as cyber-security or algorithmic fairness in AI-driven lending decisions, areas where digital financial literacy among users is increasingly recognised as a governance concern (Jahanzeb et al., 2026).

5.2.2 Implications for Institutional Investors

For institutional investors, particularly large institutional bodies such as the Employees Provident Fund (EPF) and Khazanah Nasional, the findings offer several important considerations for their ESG-based investment decision-making. The null relationship between overall ESG scores and financial performance under the FE estimator indicates that higher current period ESG scores do not reliably predict superior short term financial returns for Malaysian DSIBs, warn against an overly simplistic application of ESG screening criteria based solely on aggregate scores. Pedersen et al. (2020) argue that rational ESG investing should be based on understanding of how different ESG dimensions translate into financial risk and return over appropriate investment horizons, rather than relying on aggregate ESG scores as direct screening tools.

Additionally, investors also should be aware of the potential divergence among different ESG rating providers when evaluating DSIB sustainability performance. Berg et al. (2022) reported that substantial disagreement across major ESG rating agencies, arising from fundamental differences in scope, measurement and weighting, which can significantly affect investment decisions based on ESG scores. This divergence suggests that investors should surveying across multiple data sources rather than relying exclusively on any single provider's composite score when conducting ESG assessments of Malaysian DSIBs. However, evidence from Broadstock et al. (2020) demonstrates that firms with stronger ESG profiles exhibit greater financial stability during periods of market disruption, suggesting that the long run risk mitigation benefits of ESG investment may be more valuable to institutional investors than the short term return enhancement, which this study is unable to detect within its sample period. Institutional investors should adopt a long horizon perspective when evaluating ESG quality among Malaysian DSIBs, recognising that the current transition period represents as an investment phase whose financial rewards are expected to materialise when ESG frameworks mature.

5.2.3 Implications for Bank Management

For bank management within Malaysian DSIBs, the findings provide several strategically important insights for resource allocation and stakeholder communication. The negative short term relationship between environmental compliance and profitability confirms that the current phase of ESG integration represents a investment period characterised by upfront costs that preceding future financial returns, rather than a low cost reputational exercise. Management should communicate this temporal arrangement transparently to their shareholders and analysts to manage expectations and prevent market mispricing of ESG investments. The study by Buallay (2018) reveals that financial advantages of ESG engagement become concentrated in longer reporting cycles in the case of European banks, supporting the argument that the management needs to paint a clear picture of long-term ESG value creation.

The null governance finding, which interpreted through the views of a ceiling effect for institutions are already highly regulated, suggests that DSIBs may derive greater financial value from directing marginal ESG investment resources towards social and environmental initiatives rather than governance improvements that provide diminishing returns above regulatory minimums. Cornett et al. (2016) find that U.S. commercial banks with stronger social responsibility programmes during the Global Financial Crisis achieved more favourable financial outcomes, proving that proactive stakeholder management can generate more financial benefits under difficult conditions. This finding encourages Malaysian DSIB management to view social ESG investments not merely as compliance obligations but also as strategic assets for building the depositor trust and community relationships that support long-term financial stability. Furthermore, the consistent negative impact of bank size on Tobin's Q across all specifications implies that management should prioritise on showing that they operate efficiently and strategic flexibility that may partially offset the regulatory

discount embedded in the market valuations of systemically important institutions.

5.3 Limitations of the Study

Despite the contributions of this study, several limitations should be acknowledged that qualify the interpretation and application of its findings.

5.3.1 Small Sample Size and Statistical Power

The most fundamental limitation is the small sample size of only three banks observed over 15 years, yielding 42 observations. Although Hsiao (2007) reported that the panel regression approach is particularly suited well for small cross-sectional samples by exploiting within-unit variation over time (Hsiao, 2007), the statistical power of the FE estimator is limited when only three cross-sectional units are observed. The FE estimator absorbs all time-invariant between-bank variation, leaving the ESG coefficients identified solely within the bank and year-to-year changes in ESG performance. This is an extremely stringent identification strategy that may be insufficient to detect small but economically meaningful ESG effects, particularly especially in the later years of the sample when ESG scores in all three banks move towards a higher level due to the regulation requirements and further reducing the available within-bank variation. Future research can incorporating a broader universe of Malaysian commercial banks to substantially increase statistical power and enhance the validation of findings.

5.3.2 Single ESG Data Provider and Measurement Bias

The second limitation is the potential measurement bias may arise by using only a single ESG data provider. The study relies exclusively on ESG scores from LSEG Workspace (formerly Refinitiv), however it being among the

most comprehensive and widely used in academic research but may not perfectly capture the entire full range of ESG activities undertaken by Malaysian DSIBs. Berg et al. (2022) found that there are substantial divergence across major ESG rating agencies arising from fundamental differences in scope, measurement methodology and indicator weighting, which implying that results derived from a single data provider may not be fully robust to alternative ESG measurement frameworks. Future studies could address this limitation by incorporating ESG scores from multiple data providers, such as MSCI, Sustainalytics and Bloomberg, to assess the sensitivity of findings to the choice of ESG measurement framework.

5.3.3 Geographic Scope and External Generalisability

Third, the study's scope is limited to three DSIBs in a single country over a 15 year period, which restricts the external transferability of the findings to other banking markets, non-DSIB banks within Malaysia or different economic environments. While the focus on DSIBs is a considered methodological choice that ensures internal homogeneity and addresses a specific research gap, the scope of inference is limited by definition. The unique regulatory environment of Malaysian DSIBs, including the CCPT framework and enhanced supervisory requirements, creates an institutional context that propably cannot directly compare to banks operating under different regulatory regimes. Gillan et al. (2021) highlight that the ESG-financial performance relationship is highly context-dependent and mediated by institutional, legal and cultural factors that vary across countries and firm types.

5.3.4 Linear Model Specification and Omitted Moderating Variables

Furthermore, the study examines only linear relationships between ESG scores and financial performance. As documented by Nollet et al. (2015), the ESG-financial performance nexus may be non-linear, with negative returns at low levels of ESG engagement transitioning to positive returns beyond a performance tipping point. This non-linearity cannot be captured by the linear panel regression models employed in this study and possible that some DSIBs in the dataset are in a transitional zone where ESG investments generate net negative returns, while others have crossed the tipping point into the value enhancing phase. Lastly, the study does not account for potential moderating variables that prior literature has identified as influential in the ESG-financial performance relationship. Ahmad et al. (2024) demonstrate that managerial ability significantly moderates how ESG investments translate into financial performance in Asian emerging markets. Besides, Cantero-Saiz et al. (2024) show that profitability levels moderate the relationship between ESG and asset quality in banking sector. The omission of these moderating factors from the model specifications may partially account for the null findings. These limitations are fully acknowledged but do not undermine the importance of the study's findings. Instead, they provide productive suggestion for future research that can build upon and extend the empirical foundation established from this research.

5.4 Recommendations for Future Research

Building upon the findings and limitations of this study, several directions for future research are proposed both substantively and methodologically.

5.4.1 Expanding Sample Scope and Cross-Country Comparisons

Future studies should expand beyond the three Malaysian DSIBs to include a broader universe of Malaysian commercial banks, including non-DSIB institutions, as well as banks across the ASEAN region. A larger cross-sectional sample would substantially enhance statistical power and increase the degrees of freedom available to the FE estimator, making it more feasible to identify small but economically meaningful ESG effects. Miralles-Quirós et al. (2019) demonstrate a significant cross-country heterogeneity in the relationship between ESG performance and shareholder value creation in banking sector, which suggesting that a comparative ASEAN study would provide more important insights into how institutional and regulatory contexts moderate the relationship between ESG and financial performance. (NEW) Such an expansion would also enable the application of more sophisticated econometric techniques, including dynamic panel models using Generalised Method of Moments (GMM) estimators, which can more effectively address potential endogeneity between ESG performance and financial performance in larger panels.

5.4.2 Extending the Time Horizon

Future research should also extend the study period after 2024 as additional years of data become available following the full implementation of BNM's CCPT framework, enhanced sustainability reporting requirements by Bursa Malaysia and the framework that will be construct in the future. The theoretical expectation is that the negative short term relationship between environmental compliance and profitability will diminish over time as the initial compliance infrastructure is amortised and long term benefits, including reduced credit losses from environmentally screened portfolios and lower funding costs from ESG-oriented investors when it begin to materialise. Eccles et al. (2014) found that the financial benefits of corporate sustainability are realised over multi-year horizons, implying that panel

datasets spanning 20 or more years may be necessary to fully capture the long term ESG-performance relationship for Malaysian DSIBs. Longitudinal data extending into the 2030 would allow researchers to test whether the environmental pillar's negative effect on profitability reverses or diminishes as Malaysian banks already complete their ESG transition.

5.4.3 Improving ESG Measurement

Regarding to the ESG measurement approach, future studies should involve multiple ESG rating sources to address the provider divergence reported by Berg et al. (2022). Additionally, researchers could support quantitative ESG scores with qualitative content analysis of bank annual reports and sustainability disclosures to develop more context specific ESG metrics for the Malaysian banking sector. The development of a tailored Malaysian banking ESG index, drawing on the seven ESG Principles launched by the Association of Banks in Malaysia (ABM) in 2022, could provide a more appropriate measurement framework that better captures the specific ESG dimensions affect to the Malaysian regulatory environment. A locally strong index would also help address the concern that global ESG scoring frameworks may not adequately reflect the sustainability priorities of ASEAN emerging markets.

5.4.4 Advancing Methodological Approaches

From a methodological perspective, future research should consider on non-linear model specifications, including quadratic regression and threshold regression approaches, to test whether the ESG-financial performance relationship follows the non-linear pattern documented by Nollet et al. (2015). Duque-Grisales and Aguilera-Caracuel (2021) further establish that the ESG-performance relationship can be significantly moderated by firm-level factors such as financial slack, which suggesting that interactive model

specifications incorporating moderating variables, including managerial ability, bank capitalisation levels and regulatory tier would help to enrich the analysis. Future studies could also employ mediation analysis to test the theoretical channels proposed by stakeholder theory, the resource-based view and signalling theory, examining whether ESG performance first improves intermediate outcomes like customer loyalty, regulatory risk or funding costs before these translate into financial performance improvements. Lastly, future studies can use event study methodologies to examine the short-term market reactions of Malaysian DSIBs to specific ESG-related announcements, such as the issuance of green bonds or the launch of ESG-linked lending products, which can provide complementary evidence on whether capital markets price ESG information in real time. Pedersen et al. (2020) stated that ESG investing is most efficiently implemented on the basis of comprehensive knowledge about the pricing of ESG information on capital markets, and event studies provide a direct empirical perspective on the pricing process.

5.5 Conclusion

This study aimed to empirically examine the relationship between ESG performance, as measured by overall ESG combined scores and individual environmental, social and governance pillar scores with the financial performance of Malaysian Domestically Systemically Important Banks, including Maybank, CIMB Group Holdings and Public Bank, over the period from 2010 to 2024. Based on stakeholder theory, the resource-based view and signalling theory, the study proposed 12 hypotheses predicting positive relationships between four ESG dimensions and three financial performance indicators: Tobin's Q, ROA and ROE. Panel regression analysis using the Hausman-selected FE estimator was employed across two model specifications, supported by two robustness tests to verify the stability of the findings.

The empirical evidence does not support the study's hypotheses. The overall ESG combined score did not show a statistically significant relationship with any of the

three financial performance measures, failing to support Research Objectives, which are RO1 and RO2 in the expected direction. In response to Research Objective RO3, the environmental pillar emerged as the ESG dimension with the strongest and most statistically significant influence on financial performance, but this influence was negative rather than positive, further supported as a significant reduction in ROA and ROE that was robust to the exclusion of COVID-19 years and confirmed as contemporaneous by lagged ESG robustness test. The social and governance pillar scores did not achieve statistical significance for any financial performance measure under the FE estimator in the main analysis, with the governance null finding interpreted as a ceiling effect because of already high standards of governance that DSIBs are required to meet as defined by the regulatory mandate.

These findings should not be interpreted as evidence that ESG is irrelevant to the long-term financial performance of Malaysian DSIBs. Instead of that, they present a clear, data-driven picture of an emerging market banking sector that is currently in an active and costly ESG transition phase, bearing substantial upfront compliance and infrastructure costs before the projected long term benefits from stronger stakeholder relationships, improved risk management and enhanced market credibility have had sufficient time to materialise. As Malaysian DSIBs continue to mature in their ESG journeys in the future, particularly as the CCPT framework becomes fully embedded and investor ESG preferences intensify following the EPF's Principles for Responsible Investment commitment, the expected positive relationship between ESG performance and financial performance may emerge more clearly in future empirical studies.

This study has made several important contributions. In academically, it provides the first focused empirical analysis of the ESG-financial performance relationship using panel data for all three Malaysian DSIBs, extending stakeholder theory, the resource-based view and signalling theory to a sector that has not been systemically researched but is essential. It also addresses a measurement gap by incorporating the market-based performance indicator Tobin's Q alongside traditional accounting measures, offering a more forward-looking assessment of ESG's impact on investor perceptions. For practitioners, the findings provide bank management with evidence to measure ESG investment expectations and communication strategies.

For regulators, the negative short term profitability impact of environmental compliance underscores the importance of considerable and well designed regulatory transition pathways. For investors, the findings highlight the importance of adopting long term perspectives and multi-dimensional ESG assessment frameworks when evaluating DSIBs.

In summary, this study contributes empirical evidence to the growing literature on sustainable finance in ASEAN emerging markets and provides a foundation for future research with larger samples, extended time horizons and more nuanced methodological approaches, which can build a more comprehensive and more complete understanding of how ESG performance shapes the financial pathway of systemically important banks in Malaysia and the broader region.

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