Impacts of the ESG on Financial Performances of Southeast Asian Companies Based on the Climate Change Risks and Environmental Management Practices

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PREFACE

The greatest gratitude and regard will be devoted to the Lord Almighty. His abundant blessing has been consistently provided to the author to finally conclude this research paper titled “Impacts of the ESG on Financial Performances of Southeast Asian Companies Based on the Climate Change Risks and Environmental Management Practices”.

This thesis is being presented to meet the requirements for a bachelor's degree in Business Management at Universitas Gadjah Mada. Furthermore, the author wishes to express heartfelt gratitude to all persons and entities who contributed to the writing of this thesis. Especially for their encouragement and support, which have been instrumental in making this educational ambition a reality.

Despite the attention and dedication spent, the author modestly admits the study's inherent limits and probable faults. The author also expresses genuine apologies for any inadequacies and invites constructive feedback to promote continuing improvements. Hopefully, the findings will assist the key stakeholders in business and environmental management.

Yogyakarta, 20 December 2023

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DEDICATION

In crafting the dedication page of this thesis, the author extends heartfelt gratitude to those whose unwavering support has served as the bedrock for the pursuit of a college education. This dedicated section pays homage to individuals who have played a pivotal role in shaping academic aspirations and providing unwavering support throughout this research journey. Their counsel, encouragement, and belief in the author's abilities have proven invaluable, significantly contributing to the successful completion of this academic endeavor. The author expresses acknowledgment and dedicates this work to those whose influence has left an enduring impact on intellectual pursuits and personal growth, as mentioned below:

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ABSTRACT

In respect to Return on Assets (ROA), a measure of financial success, this research article explores the complex interactions among Environmental, Social, and Governance (ESG) ratings, Environmental Management Practices (EMP), and Climate Change Risk (CCR) disclosure. The Technical Cooperation among Developing nations (TCDC) nations of Southeast Asia—Indonesia, Malaysia, Vietnam, Singapore, and Thailand—provide panel data for the study. The chosen businesses—palm oil, pulp and timber, and natural rubber—are evaluated and included in the SPOTT ESG evaluation, which focuses on those that source from or operate in tropical forest environments. The study uses the 2020–2022 timeframe for financial return analysis and the years 2019–2021 for ESG-related data. Multiple regression analysis with Pooled Least Square (PLS) and Random Effect Model (REM) are employed.

According to the study, there is a positive relationship between ROA and ESG score, which means that organizations with higher ESG ratings typically do better financially. Nonetheless, a significant discovery suggests that complete disclosure of CCR is negatively related to ROA, implying a significant reduction in financial performance following full disclosure of such risks. CCR disclosure has been demonstrated to mitigate the impact of ESG on ROA. As a result, organizations that disclose their climate change risks may be able to improve their financial performance by increasing their ESG ratings.

Keywords: ROA, ESG ratings, EMP, CCR disclosure, Southeast Asia, SPOTT ESG evaluation, Financial performance, Tropical forest environments.

INTISARI

Sehubungan dengan *Return on Assets (ROA)*, sebuah ukuran keberhasilan keuangan, artikel penelitian ini mengeksplorasi interaksi yang kompleks antara peringkat Lingkungan, Sosial, dan Tata Kelola *(ESG)*, Praktik Manajemen Lingkungan (EMP), dan pengungkapan Risiko Perubahan Iklim *(CCR)*. Kerja Sama Teknis di antara Negara-negara Berkembang *(TCDC)* di Asia Tenggara - Indonesia, Malaysia, Vietnam, Singapura, dan Thailand - menyediakan data panel untuk penelitian ini. Bisnis yang dipilih - minyak kelapa sawit, kertas dan kayu, dan karet alam - dievaluasi dan dimasukkan dalam evaluasi SPOTT ESG, yang berfokus pada bisnis yang bersumber dari atau beroperasi di lingkungan hutan tropis. Studi ini menggunakan jangka waktu 2020-2022 untuk analisis laba keuangan dan tahun 2019-2021 untuk data terkait LST. Analisis regresi berganda dengan *Pooled Least Square (PLS)* dan *Random Effect Model (REM)* digunakan.

Menurut penelitian ini, terdapat hubungan positif antara *ROA* dan skor *ESG*, yang berarti bahwa organisasi dengan peringkat *ESG* yang lebih tinggi biasanya memiliki kinerja keuangan yang lebih baik. Meskipun demikian, terdapat temuan signifikan yang menunjukkan bahwa pengungkapan *CCR* secara lengkap berhubungan negatif dengan *ROA*, yang menyiratkan adanya penurunan kinerja keuangan yang signifikan setelah pengungkapan penuh atas risiko-risiko tersebut. Pengungkapan *CCR* telah terbukti dapat mengurangi dampak *ESG* terhadap *ROA*. Sebagai hasilnya, organisasi yang mengungkapkan risiko perubahan iklim mungkin dapat meningkatkan kinerja keuangan mereka dengan meningkatkan peringkat *ESG* mereka.

Kata-kata kunci: *ROA*, peringkat *ESG*, *EMP*, pengungkapan *CCR*, Asia Tenggara, evaluasi *ESG* SPOTT, kinerja keuangan, lingkungan hutan tropis.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER 1
INTRODUCTION

1.1 Study Background

Among all other emerging topics that have taken the global leaders' eye, the global environmental condition has become one of the most well-debated topics. To this date, the prolonged fear over the possible harmful impact of environmental degradation has slowly come true, even in a harsh way in many sectors. According to the report of Lindsey & Dahlman (2023), the average global temperature over the decade (1980-2022) has increased by 0.8 Celsius, which shows linearity with the amount of carbon dioxide and greenhouse gasses emitted in that time frame. The global average temperature increase has changed our planet's situation, followed by the surrounding changes such as the rising sea level and land area change (Karl et al., 2009).

Businesses, governments, and other world authorities across industries have imposed policies and initiatives to prevent and alleviate further damages due to climate change risks and work towards a common goal. The Paris Agreement, established to maintain the temperature rise not to exceed 2 Celsius, was enacted in 2015 as the first legally binding policy currently being imposed globally (Dimitrov, 2016). According to a publication by Bruce Chew et al. (2021), the Government of the United States, under the leadership of Joe Biden, has set higher urgency for the whole ecosystem to collaborate and participate as climate change agents. The representation of the US appetite towards climate change might be able to depict the rising awareness from the global perspective on environmental-based views as the values to set within society and incorporate into public policy (Rushefsky, 1996). However, it is not only exclusive to the government and business; the participation of all stakeholders is necessary to enhance climate change education and awareness (Ho et al., 2023).

Through the ASEAN joining body in Southeast Asia, the authorities have begun participating in climate change matters through the road map established surrounding political, economic, and sociocultural contexts (Letchumanan, 2010). Implementing such initiatives is not only imposed as a binding policy but as an actionable framework. With the potentially harmful effects and risks caused by climate risk revolving around all aspects of society (i.e., health, economy, and politics), mitigation is needed by integrating and realizing the uncertainties into the approach, such as policymaking (van der Keur et al., 2016). Southeast Asia, represented by ASEAN, has shown an increase in proactiveness by setting policies and actionable plans for climate change issues (Letchumanan, 2010). The countries joining ASEAN have always been considered attractive due to the dynamic economic and demographic conditions and their growing significance on the global economy (Hill & Arndt, 2002). Over the past few years, several countries within ASEAN (i.e., Indonesia, Malaysia, the Philippines, Thailand, Singapore, and Vietnam) have participated in increasing cross-country social well-being by being involved in technical cooperation among developing countries (TCDC) (OECD, 2022a).

The realization of the detrimental impact of climate change has been predicted to have a profound effect over the long term, especially concerning the economic welfare of a country and an even worse impact on less developed countries (Tol, 2009). According to Mendelsohn (2000), the impact of climate change in developing countries is found to be more adverse due to the less extensive use of capital and technology and the tendency to be located in hotter climates compared to developed countries. In contrast, the worst impact of climate change on developing countries is due to tighter financial constraints to achieve a balance between short-term (e.g., infrastructure maintenance cost) and the long-term, that is, the need to allocate funds in climate change-related initiatives (Chinowsky et al., 2011). The ASEAN countries, especially those participating in the technical cooperation initiative, mainly consist of developing nations, leaving Singapore as the only developed nation (OECD, 2022a).

The negative impact of climate change also reaches the extent that the increase in uncertainties will also have implications for businesses due to the higher cost it produces (Henderson, 2018). To further explain, the potential uncertainties due to the changing pattern and condition of the climate have altered the profitability of businesses as they must consider higher risk in their discount rates and income volatility. The scope of loss due to the rising uncertainties spans business activities such as supply chain due to the increasing probability of disruptions throughout the value chain (Er Kara et al., 2020). Adding from a financial service perspective, the extent to which the uncertainties that took place can result in potentially non-insurable cases that harm profitability (Kunreuther & Michel-Kerjan, 2007). The uncertainties induced by the effect of climate change lead to the higher commodity prices set by businesses to justify the loss caused by the possible value chain disruption that could hamper consumption and business profitability (Khan et al., 2020).

The agriculture industry had contributed a significant stake within the GDP pie of Southeast Asia, which amounted to 10.5% of the GDP in 2022, with a significant contribution of exports in the Agri-commodities sector (IRENA, 2022). Based on a study by Anbumozhi et al. (2012), Southeast Asia and Africa are the two regions that were predicted to incur the highest potential loss due to climate change, especially in the agricultural sector. In Southeast Asia, it is profoundly known that the palm oil business has a significant presence (i.e., 84% of the total production). It is considered one of the fastest-growing crops, contributing 4% of the agricultural land within tropical areas (Bicknell et al., 2023). Following the significance of palm oil, the natural rubber industry's significance within Southeast Asia has increased due to its growing demand, proven by the doubling of its cultivation areas in the last decade (Chiarelli et al., 2020). The timber and pulp industry was also found to be going in the same direction caused by the increase in global demand (Obidzinski & Dermawan, 2012).

Despite the growing significance of agriculture commodities, especially among its sub-industry (i.e., Palm oil, natural rubber, timber and pulp), the rising prominence is still followed by apprehension over the negative impact it might have. According to SPOTT (2019), the need to assess the sustainability practices of companies participating in the tropical forest landscape is attributable to the significance of its role in becoming carbon sinks and storage. According to a study concerning timber and pulp growing share in Southeast Asia, its growing existence simultaneously raises the urgency of the environmental off-sets entailed by the activities due to the usage of natural forests (Obidzinski & Dermawan, 2012). From the palm oil perspective, the impact of business activities within the palm oil sector has occurred across countries, shown by the haze visible to the eyes due to peat and fires (Varkkey, 2015). Similarly, the natural rubber industry has also grown concerned about its business undertakings due to the direct harm it produces due to its nature of absorbing water, which might induce water scarcity on the lands it occupies (Chiarelli et al., 2020).

With the rising uncertainties that climate change might possess on industries, investors are now more likely to incorporate ESG value into their portfolio assessment factors (Jagannathan et al., 2017). In the context of palm oil, investors' need for its ESG values is driven by the significant influence of smallholders' involvement in conducting its operations and the need to realize and prevent possible risks (R & J.W, 2017). Within the palm oil industry, the problem involves the smallholders due to the problem of land-grabbing practices that harm smallholders' well-being, possibly harming business profitability. The incorporation of ESG values in the palm oil industry is also forced by the precautionary need over possible consumer action to reject unsustainable practices (Jagannathan et al., 2018). However, the rising concern of investors about assessing portfolios based on ethical consideration indicators is obstructed by the lack of reporting standards (Amel-Zadeh & Serafeim, 2018). In addition, the uncertainties reduced by the realization of inherent risk from ESG disclosure, proxied with ESG score, does not involve only the risk of climate change but also the risk from the

possible regulatory change within climate change-sensitive industries (Jagannathan et al., 2018). The use of ESG score within this research is to assess the impact of ESG disclosure on the risk-adjusted financial performance of companies.

Lies within the multiple matrices of ESG score, the climate change risk (CCR) disclosure plays an essential role in assessing whether companies have realized and incorporated relevant steps to prevent such risk that could hamper long-term profitability (Flammer et al., 2021). In addition, the need for such risk disclosure shows the investor that the company has a long-term prospect on its financial performance that increases the company value over the long term, especially for those involved in climate change-sensitive industries. According to research by Iriyadi & Antonio (2021), climate change risk disclosure is found to improve the long-term financial performance of companies despite the negative impact of financial performance over the short term. In the short term, companies' initiatives and substantial investment in environmental performance by excessively focusing on climate change-related risk may hamper the firm profitability (Chen et al., 2022). Hence, this research investigates the degree to which companies involved in forestry plantations should reveal climate change risk as a moderating variable to enhance their financial performance.

Another assessed variable within this research, the environmental management practice (EMP), has been found to contribute to firms' environmental performance in accordance with institutional and resource-based view theories (Aslam et al., 2020). Based on institutional theory, actors tend to comply with the established rules, which are institutionally acceptable, in a context where firms are faced with limited information and high uncertainties (Hotimsky et al., 2006). In the light of the resource-based view theory, companies achieving higher ESG performance by contributing to EMP are supported by the resources the management has allocated towards such practices (Gavronski et al., 2011). By contributing to EMP, firms tend to achieve higher financial performance, which is also moderated by increased environmental performance (Aslam et al., 2021).

However, the impact of EMP on a firm's financial performance varies according to the company's context, especially according to the industry and institutional landscape (Lucas & Noordewier, 2016). Consequently, the impact of focusing on environmental management practice (EMP) as a contextual background for companies engaging within the tropical forest industry in Southeast Asia is the interest of this research.

1.2 Problem Statement

The commodity of palm oil has significantly increased due to the versatility of the byproducts spread worldwide throughout its global supply chain (Shigetomi et al., 2020). Alongside the surging demand for this commodity, there is also a shift in the dominance of the producer from Africa to Southeast Asia, especially Indonesia and Malaysia, currently possessing the largest share of the global production by contributing to more than 80% of the global production in 2017 (Iskandar et al., 2018). Similar to palm oil, the extent of tropical forestry commodities (i.e., natural rubber, timber, and pulp commodities) is also gaining traction in Southeast Asia as the area contributed more than 85% of global production in 2014 and is projected to keep on surging (Warren-Thomas et al., 2018).

The increasing global demand for tropical forestry commodities has forced significant producer countries, especially in Southeast Asia, to increase the development of forestry plantations area (Liu et al., 2018). Unfortunately, the need to increase the supply comes with the cost of replacement of natural forestry, which could harm the ecosystem and decrease carbon storage areas (Uning et al., 2020). In 2011, the deforestation rate in Indonesia was estimated at 17-127% for palm oil, 44-129% for timber, and 3.1-11.1% for logging, followed by Malaysia with 0.54% accounting for its forestry industry. Scholars have concluded that the need for transparency, manifested in ESG score, is gaining importance on the road to achieving net zero (Hoang & Kanemoto, 2021). In addition, companies' ESG performance is found to vary regionally (He et al., 2023). Hence, the weighty impact of the tropical forestry industry on climate change, the dominance of Southeast Asia

production, and the possible regional impact differences have increased the urgency to assess the impact of forestry-commodities-producing companies' ESG transparency score within the Southeast Asia context.

Contemporarily, the extent of studies examining the relationship between ESG scores and financial performance still have possible meaningful linkages to be unveiled as the topic is an open field to be explored. According to a meta-meta-analysis by Whelan et al. (2022), studies examining ESG score and Financial Performance (FP) among researchers have gained traction as the awareness and urgency of climate change are surging. Among the papers studied, positive correlations between ESG and financial performance are found among more than 50% of corporate and investor-based studies. From the corporate perspective, the impact of ESG on financial performance is realized through the involvement of mediating factors, which also focus on sustainability strategies and practices rather than disclosure only. Hence, to assess ESG performance's impact on corporate financial performance, this research incorporates the moderating factors of environmental management practices and climate change risk disclosure to unveil such practices' contribution to corporate financial performance. Furthermore, the exploration of environmental management practices along with climate change risk disclosure as moderating factors of ESG and corporate financial performance is still under-examined.

1.3 Research Question

Based on the formulated background, to explore the research gap of ESG performance impact on corporate financial performance based on the moderating impact of EMP and CCR disclosure in the Southeast Asia context, the following questions are to be examined:

1. Does ESG Score affect the ROA of forestry plantation companies in Southeast Asia?
2. Do environmental management practices (EMP) affect the ROA of forestry plantation companies in Southeast Asia?

3. Does the disclosure of climate change risk (CCR) affect the ROA of forestry plantation companies in Southeast Asia?
4. Do environmental management practices (EMP) moderate the impact of ESG performance indicators on the ROA of forestry plantation companies in Southeast Asia?
5. Does the disclosure of climate change risk (CCR) moderate the impact of ESG performance indicators on the ROA of forestry plantation companies in Southeast Asia?

1.4 Research Objectives

1. To examine the effect of ESG Score on ROA as a corporate financial performance indicator of forestry plantation companies and the impact's significance.
2. To examine the effect of environmental management practice (EMP) on ROA as a corporate financial performance indicator of forestry plantation companies and the impact significance.
3. To examine the effect of climate change risk (CCR) disclosure on ROA as a corporate financial performance indicator of forestry plantation companies in Southeast Asia.
4. To examine the moderating effect of environmental management practice (EMP) on ROA as a corporate financial performance indicator of forestry plantation companies and the impact significance.
5. To examine the moderating effect of climate change risk (CCR) disclosure on ROA as a corporate financial performance indicator of forestry plantation companies in Southeast Asia.

1.5 Research Motivation

Southeast Asia's dominance as the producer of Agri-commodities products was initiated by the legacy of European colonialism from the nineteenth century to cater to the global appetite for such commodities, demonstrated by the emergence of megaprojects of forestry commodities (Kenney-Lazar & Ishikawa, 2019). The

global appetite for such commodities came with the risk of deforestation, which has been found to occur exponentially in centers of diversity such as Southeast Asia (Hoang & Kanemoto, 2021). In addition, the specified study has found that over fifteen years (2001-2015), the average loss of trees per person amounted to 3.9. On top of that, the direction of the loss figure will not decrease anytime soon despite the initiated bans on palm oil usage as biofuel among EU countries, and it is predicted to grow in a positive figure (Voora Vivek et al., 2023).

As a region consisting of many developing countries, the growing importance of Southeast Asia in further addressing and determining the correct initiative and strategy to mitigate climate change needs to be addressed (Mertz et al., 2009). The primary reason contributing to this urgency is that developing countries, which are found to be more vulnerable, are prone to the negative impact of climate change risk. The plantation commodities under this research's interest (i.e., palm oil, natural rubber, timber, pulp) are mainly produced in Southeast Asia (Voora Vivek et al., 2023). The land use change is due to commodity plantations, taking the case of natural rubber in Southeast Asia, which has grown by 1.8 times in the past 30 years which also come with prevailing negative effect such as land-use change that gives rise to climate change (V et al., 2020). In addition, to capture the regional disparities among regions with historical situations of dense forestry, the rate of tree cover in Indonesia is declining at the rate of 20% compared to South America, achieved a tree-cover gain of 10% due to better implementation of environmental management practice (Sloan et al., 2019).

The characteristics of forestry plantation commodities were closely linked and linear with the deforestation rate, which expedites the rate of global climate change (Pendrill et al., 2019). Plantation and forestry have a significant role in managing the global carbon situation because they act as carbon sequesters and sinks (Kumar et al., 2022). Therefore, the forestry plantation business operations that are found to have a significant role in global deforestation are also closely linked to the increasing rate of carbon emission as a weighty cause of climate

change (Kumar et al., 2022). The realized negative impact of climate change has been experienced globally and profoundly manifested with the rising temperature, which comes with a higher urgency to contribute towards exploring and studying possible alternatives to mitigate climate change.

The forestry plantation industry is comprised of businesses operating as producers, processors, and traders of forestry plantation commodities (Perdana et al., 2012). The practices or initiatives and the companies' strategic direction on the scope of climate change awareness have significantly contributed to the industry's future projection of global climate change conditions. Companies to mitigate climate change may incorporate and emphasize environmental management practices to embody ESG pillars in the hope of better contribution towards climate change mitigation. In addition, the disclosure of climate change risk, as one of the matrices listed within ESG score transparency, is to be highlighted to understand the significance of climate risk disclosure that represents how the risk is being acknowledged, addressed, and anticipated to ensure long term business profitability through the measure of corporate financial performance. However, companies are motivated to allocate resources to pursue efficiency and higher marginal impact on every cost and effort spent (Ekins et al., 2016). Therefore, this research is motivated to know how the initiatives (i.e., EMP and CCR) as a matrix within the ESG score will significantly affect the company's financial performance.

1.6 Research Contribution

1.6.1 Practical Contribution

With the current climate change situation, companies that are operating within the forestry plantation industry are pressured to focus on climate change mitigation, which is measured by ESG score. In addition, investors are also inclined to consider ESG value within their portfolio bucket with the hope that those companies are more resilient towards risks and may generate higher financial performance. This research will assist companies involved in the forestry plantation industry value chain (i.e., producers, processors, and traders) in choosing what initiatives and

strategies to focus on under the motivation to incorporate ESG value. At the same time, they strategically increase their corporate financial performance. For investors, this research will provide a guide in assessing whether companies' publicity around ESG values is an effective means to achieve higher company performance.

1.6.2 Theoretical Contribution

The extent of studies within the field of ESG needs to be extensively explored to unveil further possible strategic initiatives and regulations to be performed and imposed on stakeholders. The set of practices of environmental management and climate change risk disclosure, which are significant to mitigate climate change and provide better financial performance for companies, can be utilized as the bottom line to reveal other essential variables. In addition, the findings of this research may be utilized as a literature review and be put into further research of related variables and context.

1.6.3 Policy Contribution

The global urgency of climate change mitigation requires the involvement of a multi-stakeholder approach, such as businesses and governments. The global roadmap for climate change mitigation, such as the Paris Agreement, has mandated global collaboration among stakeholders. In the context of institutional and regulations, measuring whether businesses foster multi-stakeholder collaboration to comply with ESG roadmaps requires standardization of criteria and practices. This research has focused on environmental management practices, which have been stipulated by criteria with a higher emphasis on climate change risk disclosure and its possible impact on corporate financial performance. Therefore, governments may set standards that are impactful for climate change mitigation while also putting into consideration the financial impact of businesses to boost the economy.

1.7 Research Scopes

This research will be performed to assess the effect of ESG scores on the company's financial performance, which will be assessed using SPOTT ESG scores and their Return on Assets published on their annual reports. The companies of interest are classified as publicly listed producers, processors, and traders of forestry plantation commodities (i.e., palm oil, natural rubber, and forestry plantation/timber and pulp) from Southeast Asian countries involved in technical cooperation among developing countries (TCDC), such as Indonesia, Vietnam, Malaysia, Singapore, the Philippines, and Thailand. The study investigates the relationship between companies' ESG score towards their ROA as a measure of corporate financial performance and the moderating impact of environmental management practice (EMP) and climate change risk (CCR) disclosure spans from 2019 to 2022.

1.8 Writing Systematics

This paper will be constructed as follows:

Chapter I Introduction

The introduction contains the research background, questions, objectives, motivation, contribution, and scopes to study the relationship between ESG score and corporate financial performance and the moderating effect of EMP and CCR disclosure in companies in the forestry plantation industry.

Chapter II Literature Review

The chapter on literature review elaborates on several relevant variables and backgrounds such as ESG score, climate change risk (CCR), environmental management practice (EMP), institutional theory, organizational theory, resource-based view theory, return on assets (ROA), Southeast Asia TCDC countries, palm oil, natural rubber, and timber and pulp industry.

Chapter III Research Method

This chapter presents the methodology and data processing to assess the significance, relationships, and other meaningful information to be obtained and analyzed from the existing data.

Chapter IV Data Analysis and Discussion

This chapter elucidates the result and analysis along with the interpretations that are obtained from the data statistics.

Chapter V Conclusion

This chapter concludes and summarizes the obtained result, further limitations, suggestions on exploration potentials, and implications for relevant stakeholders.

CHAPTER 2
LITERATURE REVIEW

2.1 Theoretical Reviews

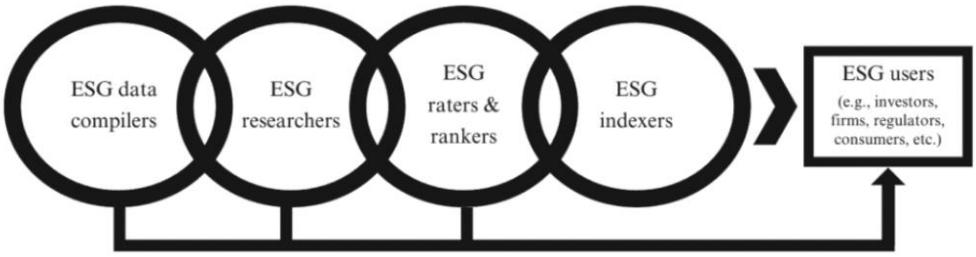
This section of the theoretical review sets out the relevant knowledge relating to the independent, dependent, and moderating variables utilized within this research through a review of theories and studies.

2.1.1 ESG Score

According to (Tao et al., 2022), ESG matrices and scores eminence among stakeholders have increased. The environmental aspect is an essential assessment for end-users, such as investors, to evaluate company performance. The ESG itself comprises the words “Environmental,” “Social,” and “Governance” as pillars that construct the quantification of company performance through scoring. The development of ESG matrices is driven by the rising shift of environmental or sustainability investment, represented by the shift of financing for environmental projects from public to private financing.

ESG rating or index, according to (Boubaker et al., 2018), is gaining momentum as a critical metric for company assessment of environmental, social, and governance performance, which provide a benchmark manifested in absolute term or quantified value. Customarily, the matrices and standards that constructed the ESG score are stipulated according to the relevant variables following the ESG issue or by complementing existing financial indexes with ESG components. In the context of investment, investors frequently perform an analysis to assess the performance of portfolio companies along with their risks. ESG indexes are manufactured to quantify and validate ESG efforts or performances of companies within a cohort of sectors, industries, or countries. Scholars have incorporated the term ESG score with various manifestations for its exploration and implications, such as sustainability, corporate social responsibility, sustainability disclosure, and ESG analysis (Clément et al., 2023).

Figure 1. ESG-investing Value chain



Note: Value increases through the value chain.

Source: Boubaker et al. (2018)

Figure 1 shows the value chain from the manufacturing of ESG scores and indexes to cater to the ESG users' needed value. ESG index acts as an investable index developed to form a benchmark calculated to measure the impact of ESG strategies of companies among a specific cohort. In Southeast Asia, the incorporation of ESG index and score by end-users has gained traction as firms' market capitalization of 608 companies within a 5-year timeframe is found to be positively correlated with their ESG score (Kartikasary et al., 2023). According to the study, a firm's value, which corresponds to its market capitalization, and its relationship with the firm's ESG score is driven by the legitimacy theory as firms are obliged to maintain positive confidence from their stakeholders that they are complying with preferred bottom lines such as sustainability practices.

2.1.2 SPOTT Assessment

SPOTT assessment is an ESG scoring project developed for three commodities within the industry of forestry plantations specifically to assess the involved companies' transparency or disclosure and compliance towards sustainability practices and policies (SPOTT, 2019). SPOTT's ESG score focuses on assessing companies engaged (i.e., producer, processor, and trader) in tropical forest landscapes, specifically for palm oil, natural rubber, and timber and pulp sub-industries. SPOTT's assessment for companies' ESG scoring is intended to provide

information concerning the transparency, practices, and compliance towards best practices in ESG.

SPOTT mainly designates its resources to assess companies involved in tropical forestry. The motivation of the platform to maintain a close relationship with firms engaging in palm oil, natural rubber, and timber and pulp is due to the vital contribution of the operating landscapes of those commodities on the environment. Tropical forestry has been found to have a significant role in accommodating species diversity, taking part as carbon sinks and stores. Therefore, companies' operations, practices, and governance within tropical forestry must be monitored.

SPOTT's assessment and methodologies to develop ESG score comprises ten stipulated criteria as listed in Table 1 below:

Table 1. SPOTT Assessment Criteria

No	Criteria
1	Sustainability policy and leadership
2	Landbank, maps, and trace
3	Certification standards
4	Deforestation and biodiversity
5	HCV, HCS, and impact assessments
6	Peat, fire, and GHG emissions
7	Water, chemical, and pest management
8	Community, land, and labor rights
9	Smallholders and suppliers
10	Governance and grievances

Source: (SPOTT, 2019)

According to the stipulated criteria for company assessment, the constructed ESG score can be interpreted as the degree of transparency of ESG reporting and firms' compliance with best practices within the industry. In addition, the SPOTT ESG score also focuses on the comprehensiveness of its policies and how the

companies are meeting their commitment towards sustainability. Therefore, a higher ESG score implies that the company is more transparent in ESG practices, reporting strives for ESG commitment in policy and governance.

2.1.3 Climate Change Risk (CCR)

According to LSE (2018), climate change risk disclosure is the report that materializes the risk of climate change related to the company's operation. Recognizing climate change risk is vital to incorporate and quantify into a firm's performance report. Recognizing such risk will help investors be informed about the potentially hampering risk of climate change to their company portfolio. Therefore, they could better calculate their portfolio risk as climate change tends to be actualized not in an immediate manner.

The recognition of the importance of climate change risk disclosure has ignited the contribution of governing parties to incorporate climate change risk disclosure among their reporting standards. From the stance of the governing body, the Financial Stability Board (FSB) has launched the Task Force on Climate-Related Financial Disclosure (TCFD), which undertakings involve making recommendations to assess and quantify climate change risk appropriately. The recommendations by TCFD on the incorporation of climate-related financial disclosure are becoming imperative to be integrated into the company's annual reports. However, the disclosure of climate change risk is contingent upon the regulatory and governance landscape in which the companies operate.

The governance to require climate change risk reporting is still conditional on the prevailing laws imposed by the relevant authorities in which the business operates. However, voluntary climate change risk disclosure initiatives, such as the Carbon Disclosure Project (CDP), have encountered rising participation among companies. Specifically for Southeast Asian countries, the increasing stance on climate change can be deduced from their ratification and submission of their

Nationally Determined Contributions (NDCs) to the United Nations Framework Convention on Climate Change (UNFCCC) (Marquardt et al., 2021).

2.1.4 Environmental Management Practices (EMP)

According to Sroufe et al. (2002), Environmental Management Practice (EMP) is defined as the practices and sets of capabilities that companies utilize to manage and investigate the impact of their business operations on the environment. The rationale for firms to focus on EMP lies within EMP's corresponding positive relationship with across-the-broad environmental performances (Famiyeh et al., 2018). In addition, the positive relationship found by the preceding study is conducted explicitly within the context of developing countries, which is pertinent to this research as most companies are involved within the jurisdiction of developing countries.

According to Nath & Ramanathan (2016) and Sroufe et al. (2002), EMP classification comprises operational, tactical, and strategic practices. Operational practices of EMP are integral to the practices that are levied internally. The scheme of operational practices of EMP is mainly intended to increase organizational efficiency, such as cost-effectiveness and waste minimization. The output of such effectiveness is imperative to the company's internal operation as it not only results in the company's increase of environmental positive impact but also the state of being cost-efficient, which may contribute to the company’s profitability. The scope of operational practices within EMP is pertinent to the recurrent operational tasks that usually take place at the workplace or shop-floor level.

Aside from operational practices, there is also EMP scope that involves tactical and strategic levels. The tactical scope of EMP revolves around the management practices that are directed toward the medium-term objective. Customarily, the tactical practices are devised by middle managers. The focus of tactical practices is on both internal and external. Tactical practices are usually materialized by the initiative to meet the environmental standards that are made

internally by incorporating external stakeholders such as suppliers and buyers. In the bargain, strategic practices focus on the long-term objective of the EMP that is appertain to the external expectancy. Conventionally, strategic practices of EMP are constructed by the top management level and can be materialized as policies, goals, and road maps to achieve long-term environmental goals.

2.1.5 Institutional Theory

Based on the book stipulating institutional theory by Scott (2005), institutional theory can be defined as the theory that reflects the embodiment of policies, schemes, regulations, and norms that are driven by the expectations of context-based authorities. The institutional theory is concerned with the embodiment of the authoritative ordinances, which involves creating, adapting, and enforcing the guidelines. The development and adoption of authoritative guidelines are affected by the need for conformity towards the institutions and the impact of social structure and perpetual conflicts within our society.

In the contemporary context, institutional theory has been widely accepted and incorporated to further explore interactions of interpersonal throughout the macro and global perspective. Institutional theory has been extensively used as a bottom line of ESG adoption and motivating factors for firms to enhance their ESG performance (Daugaard & Ding, 2022). As companies have a close relationship with their stakeholders, especially investors, their business operations and strategies are under the close surveillance of related stakeholders. The performance matrices under the surveillance of the relevant stakeholders involve the company's ESG-related performance. Institutional theory intercalates within the relationship of stakeholders and businesses as stakeholders can only exert authority towards businesses with legitimate institutional profiles.

2.1.6 Stakeholder Theory

Based on the research of Daugaard & Ding (2022), which studied the global driver of ESG, stakeholder theory plays an integral part as a bottom line for companies to

enhance their ESG performance. According to the study, stakeholder theory's prevailing relationship with the company lies along the reciprocity relationship between the company and its stakeholders. The reciprocity relationship is significant for both companies and stakeholders as it is materialized in the firm's value creation and stakeholders' well-being.

According to the study of He et al. (2023), stakeholder theory is defined as the theory that drives companies to consider the interests of all stakeholders involved, as those categorized as stakeholders might both affect and be affected by the company's achievement or performance. The scope of stakeholders who possess influence can be classified into external and internal stakeholders. Internal stakeholders comprise owners, employees, suppliers, and customers. In addition, external stakeholders comprise governments or authorities, relevant groups (e.g., environmentalists, special interest groups, etc.), and media. The proper segmentation of the related stakeholders ' interests and behavior shall be considered, as it is imperative better to navigate the company's strategies and management practices.

According to Li et al. (2021), per the driving factors of enhancing ESG performance, companies that acknowledge the importance of stakeholder reciprocal relationships may achieve more excellent company performance. Companies' performance measures can be materialized in several aspects, especially ESG and corporate financial performance, which are primary measures of performance. Incorporating the stakeholder theory benefits the company by providing more financing channels and establishing secured stakeholders' relationships to reduce uncertainty, agency cost, and informational asymmetry. Considering the uttered benefits, the stakeholder's theory is relevant to this research as it furnishes the company with the recipe to achieve a better ESG score.

2.1.7 Resource-based View Theory

The resource-based view (RBV) theory has been extensively utilized across studies and defined, especially relating to the firm's conduct, to attain sustainable competitive advantage (Taher, 2012). The background of this finding is backed by the assumption that business or economic actors tend to act as utility maximizers. Hence, to maximize utility, actors within the company may leverage the resources possessed by the company along with their capabilities to increase competitiveness. On top of that, to achieve sustainable competitive advantage (SCA), the existing resources need to be classified as valuable, rare, imitable, and organized.

According to Li et al. (2021), relating to ESG performance, the RBV theory is closely related to how businesses can procure and maintain their resources to be reliable. The strategy related to resources is imperative for businesses to cope with the ubiquitous uncertainties due to climate change risks. From a complementary perspective, having to incorporate ESG value can be seen as a resource that would benefit the company in the long term. The aligned resources to pursue sustainability and ESG score might become the bottom line to achieve sustainable competitive advantage. A sustainable competitive advantage might be realized due to the resilience from long-term risk and the solid company-stakeholder relationship on which the company could rely.

2.1.8 Southeast Asia TCDC Countries

According to OECD (2022), the initiative of countries within Southeast Asia to collaborate and form an alliance of technical cooperation of developing countries (TCDC) has set to achieve the target for sustainable development target in 2030. The countries classified to conduct the TCDC initiative in Southeast Asia are Indonesia, Singapore, Malaysia, the Philippines, Vietnam, and Thailand. The main objective for these Southeast Asian countries, as a part of the Association of Southeast Asian Nations (ASEAN), in forming a joint force of TCDC is to reduce the existing development gap between nations. The regional development strategy of TCDC is particularly a cascade of South-South Cooperation (SSC), which is

stipulated as a roadmap of development strategy within the area of economy, technology, politics, and cultural scope.

However, there are still no extensive publications or studies relating to the collaboration between the countries involved in the TCDC among ASEAN towards the ESG value creation of companies operating within those countries. The studies surrounding the implications of TCDC joint force within ASEAN nations are limited to the scope of climate change risk and road maps of cooperation.

2.2 Previous Relevant Research

The studies concerning ESG performance and ESG score towards a firm's financial performance have been utterly studied in diverse contexts. However, this research is mainly based on the study of Chen et al. (2022) and Ali et al. (2022), as both studies reinforce the inquiry of the two moderating variables of climate change risk (CCR) disclosure and environmental management practices (EMP).

Based on the previous relevant studies that explicate the relationship between ESG scores and corporate financial performance in Table 2, there are diverse findings on the repercussions of ESG scores on financial performance matrices. The measurements of financial performance that are utilized in those studies are mainly return on assets (ROA) and Tobin's Q. The employment of ROA can be a proxy of a company's short-term financial performance. At the same time, Tobin's Q serves as a proxy for a firm's value based on shareholders' wealth (Amuktha & Nair, 2019).

The negative relationship between ESG score and ROA can be derived from several possible issues. Considering the nature of ROA, which serves as a proxy for short-term financial performance, the effort of companies to focus on ESG may not be profitable in the short term due to the limited financial resources to repay its short-term obligations and expenses (Duque-Grisales & Aguilera-Caracuel, 2021). Meanwhile, most previous relevant studies showcased that ESG score or

performance among firms in various contexts may induce higher financial performance measured by Tobin's Q. One of the studies exhibits that Tobin's Q positive sign on firms are aligned with its nature to reflect firm's market performance (Ahmad et al., 2021). Tobin's Q has been extensively used to understand a firm's long-term financial performance as it reflects the market value of which shareholders perceived (shareholders confidence) (Yoo & Managi, 2022).

Table 2. Previous Research of ESG Score, EMP, CCR disclosure, and FP

Title - Author (Years)	**Methodology: Data**	**Relationship between ESG Score and Firm FP**
Carbon performance, company financial performance, financial value, and transmission channel: an analysis of South African listed companies - (Ganda, 2022)	107 CDP listed companies, South Africa, 2014-2018	Short-term: - ROA: significant positive - Tobin's Q: significant positive Long-term: - ROA: significant negative - Tobin's Q: significant positive
Does ESG performance have an impact on financial performance? Evidence from Germany - Velte (2017)	412 firm-year Observations, Germany, 2010-2014	- ROA: Positive - Tobin's Q: N/A
ESG and Corporate Financial Performance: A Panel Study of Indian Companies - Dalal & Thaker (2019)	65 firms, India, 2015-2017	- ROA: significant positive - Tobin's Q: significant positive
Examining impact of ESG Score on Financial Performance of Healthcare Companies - Kalia & Aggarwal (2022)	468 health-care firms, Global, 2020	- Developed Countries: Positive - Developing countries: Negative or Insignificant
Environmental, Social and Governance (ESG) Scores and Financial Performance of Multilatinas: Moderating Effects of Geographic International Diversification and Financial Slack - Duque-	104 multinational firms – Brazil, Chile, Colombia, Mexico, and Peru – 2011-2025	- ROA: Negative

Grisales & Aguilera-Caracuel (2021)		
The ESG Disclosure and the Financial Performance of Norwegian Listed Firms - Giannopoulos et al. (2022)	20 Norwegian Public Companies – Norway – 2010-2019	- ROA: Negative - Tobin's Q: Positive
Environmental management practices and financial performance using data envelopment analysis in Japan: The mediating role of environmental performance - (Aslam et al., 2021)	Nikkei 225 listed firms – Japan - 2007-2018	- EMP positively correlated with FP - EMP results in EP - EP positively moderates EMP and FP

Source: Processed Data (2023)

The study by Chen et al. (2022) explored the impact of ownership structure and climate change risk disclosure and opportunities on a firm's financial performance in the manufacturing industry. This research utilized the approach of a multilevel quadratic growth model towards 100 manufacturing firms globally within the time range of 2005 to 2020. This research showed that the acknowledgment or transparency of climate change disclosure and risk has a significant positive impact on manufacturing firms' financial performance. As this research also intriguingly unveils the case of private firms, there is an exciting relationship between CCR disclosure on ESG and financial performance in private firms. The finding exhibits that there is a positive yet negatively moderating effect of CCR disclosure on a firm's financial performance. Therefore, it is in the interest of this research to bring to light the moderating role of CCR disclosure under different contexts, particularly public agriculture firms in Southeast Asia.

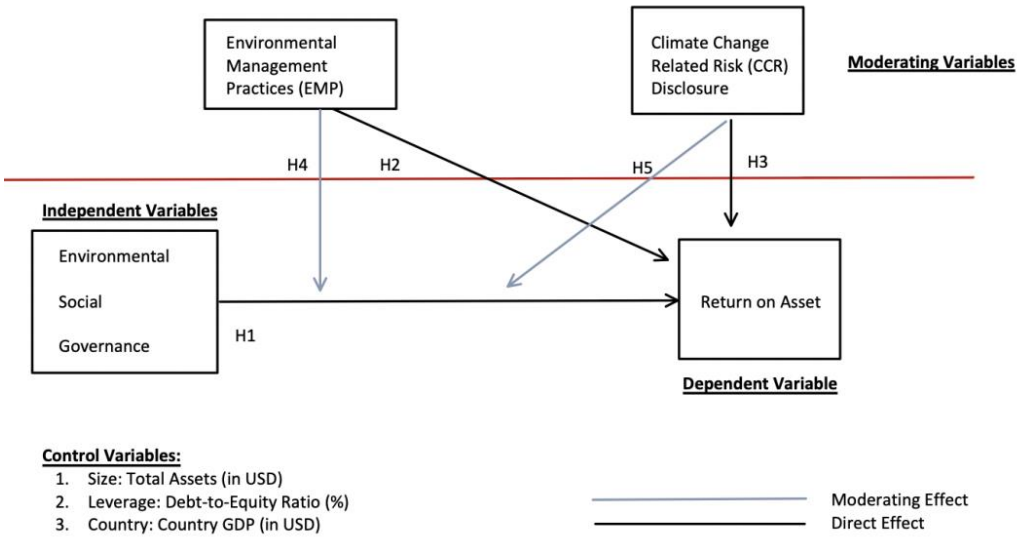
The research of Ali et al. (2022) examined the impact of environmental management practice (EMP) on a firm's financial performance (FP) and the moderating role of environmental performance (EP) and ESG disclosure. The research employed data envelopment analysis (DEA) and generalized method of moments (GMM) towards 141 publicly listed industrial firms in Malaysia from 2009 to 2020. The research discovered that there is a significant positive

relationship between EMP and FP. The practices relating to the environmental management of firms have induced higher environmental performance (EP) and ESG disclosure as a moderator, which generated better financial performance. As it has been showcased that EMP leads to FP, it is fascinating to tailor the relationship matrix to measure the moderating role of EMP within the relationship between ESG score and FP, which will be covered in this research. By incorporating EMP as a moderating variable, the extent to which the firm shall conduct its practices to achieve higher FP will be exposed.

2.3 Hypothesis

Figure 2 depicts the basic hypothesis formulation within this research to approve or reject the potential nexus between independent (explanatory), dependent (explained), and moderating variables.

Figure 2. Research Framework



The forestry plantation industry is remarked to have a sensitive and relatively direct impact on the environment. Therefore, the need to exert ESG values within their operations to reduce their environmental impact and increase their ESG reputation among investors is necessitous. The driving factor of companies to

address such issues is perceived to be related to their financial performance. According to the previous relevant studies, the incorporation of ESG values predominantly reinforces a firm's financial performance, which can be measured by return on assets (ROA).

H_1: ESG Score has a significant correlation with ROA of forestry plantation companies.

The motivating factors of companies to focus on EMP to attain better financial performance are also aligned with the prevalence of RBV and stakeholders' theories. As stipulated by the RBV theory, companies with the right capabilities and resources could be orchestrated as EMPs to procure sustainable competitive advantage. Similarly, implementing ESG values as EMP may result in better relationships with stakeholders. ESG values and good stakeholder relationships could be hailed and incorporated by companies as a resource and capability to achieve sustainable competitive advantage. Hence, companies that incorporate EMP are hypothesized to achieve better financial performance.

H_2: Environmental management practice (EMP) has a significant correlation with ROA of forestry plantation companies.

The acknowledgment of climate change risk (CCR) is plausible for companies to transform their practices and operations to incorporate better risk management. Therefore, the disclosure of CCR, as a manifestation of management's apprehension of CCR, may transform companies to be resilient, which leads to higher financial performance. The acknowledgment of CCR is presumably synchronized with other long-term risks due to higher profit security under better risk management.

H_3: Disclosure of climate change risk (CCR) has significant correlation with ROA of forestry plantation companies.

The role of environmental management practice (EMP) may be reckoned to be one of the critical enablers to materialize the impact of ESG performance on

financial performance. The institutional, resource-based view (RBV), and stakeholders' theories serve as a basis or the fundamentals on how environmental management practice (EMP) would yield better firm financial performance. Based on institutional theory, the institutional landscape and force affect companies' desideratum of environmental management perpetration. As for the public image of companies is influenced by their practice's conformity with the institution's requirements or imposed regulations.

H_4: Environmental management practice (EMP) positively moderating the effect of ESG performance and ROA of forestry plantation companies.

The practice of disclosing climate change risk (CCR) has started to be conceived as a pivotal deed by companies. The magnitude of appetite over companies that disclose their CCR has increased among stakeholders that are impassioned towards ESG values. The cornerstone and the driving force of stakeholders' intensifying fondness for ESG values is driven by the confidence of the firm's perceived agility by the ability to overcome long-term risk. On top of that, CCR disclosure has been embedded in the matrices of ESG score or performance. As the ESG score is widely scrutinized by investors throughout the deliberation of their portfolio and ESG assessors incorporate CCR disclosure into the matrices, it showcases how CCR has gained importance as a measure of company performance.

H_5: Disclosure of climate change risk (CCR) positively moderating the effect of ESG performance and ROA of forestry plantation companies.

CHAPTER 3
RESEARCH METHOD

3.1 Research Design

This research encompasses the method of quantitative analysis to measure the effect of dependent variables on independent variables. Furthermore, the presence of moderating variables will also complement and further explain the inferences of the relationships between variables. The independent variables comprise ESG score, environmental management practice (EMP), and climate change risk (CCR) disclosure of companies. The preceding independent variables will be tested to scrutinize each of the independent variables towards the dependent variable, which is financial performance as measured by return on assets (ROA). On top of that, this research is also intended to test for the moderating effect of EMP and CCR disclosure between ESG score and company financial performance.

3.2 Population and Sample

The population of interest that will be examined in this study is designated as all companies that are assessed and listed in the SPOTT ESG assessment. All companies that SPOTT assesses are reckoned to operate and/or source within the tropical forest landscape (i.e., Palm oil, Timber and Pulp, and Natural Rubber). In addition, the method of sampling adopted for this research is purposive sampling, which aims to cater to the needed research objective as this research accosts data limitations. As the methodology that is being used to assess the companies was revised in 2019 with a more comprehensive method that would cater to this research, the ESG scores will be obtained from the 2019 score.

The employed samples to test the hypothesis comprise publicly listed companies appraised by SPOTT assessment, with their parent-level or headquarters located in countries that are involved in Southeast Asia's Technical Cooperation among Developing Countries (TCDC). The countries classified as Southeast Asia TCDC comprise Indonesia, Malaysia, Vietnam, Singapore, Thailand, and the

Philippines. However, as the period in which the ESG performance data was obtained spanned between 2019 and 2021, the companies that originated from the Philippines were excluded. The Philippines-originated companies were just recently appraised by SPOTT in 2022 and have not yet been assessed within this research's period of interest. Thus, the final list of countries from which the observations originated were Indonesia, Malaysia, Vietnam, Singapore, and Thailand.

The data pulled for the samples will be from 2019 to 2021 for the ESG-related data such as ESG Score, EMP Score, and CCR disclosure. Furthermore, to test for the hypothesis, the preceding period of ESG performances in the 2020-2022 data were needed for the financial return, particularly for return on asset (ROA). The Debt-to-Equity (DER), and total assets (TA) as control variables were also procured from the same period with return on assets (ROA). As a complement, GDP figures were also needed to address the difference from the perspective of the companies' country of headquarters. The utilized datasets for this research can be found in Appendix 2.

3.3 Operational Definition of Variables

1. Environmental Social Governance (ESG) Score as Independent Variable

Based on the data source, SPOTT (2019), the ESG score is defined as the degree of transparency for the listed companies regarding their operations, commitments, and policies. In addition, the score also appraises the quality, comprehensiveness, and verifiability of the stipulated commitments and implementations. The ESG scores that this research employed are sourced from the SPOTT's assessments based on observed companies' ESG transparency.

2. Environmental Management Practices (EMP) as Independent and Moderating Variable

EMP is defined as the conduct within the scope of operations, strategy, and tactics aimed to monitor and control the negative influence of business operations on the

environment. The stipulated items classified as EMP, per the research of Ali et al. (2022), comprise organizational, process, policy, and monitoring. Furthermore, the matrices of EMP Score have been operationalized in Appendix 1: EMP Scale.

The EMP Score calculation mechanism is determined by the following equation:

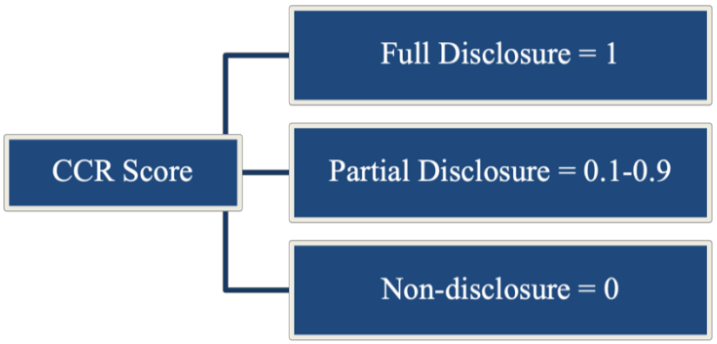
$$\text{EMP Score \%} = \frac{\text{EMP Score}}{\text{Maximum EMP Score}} \% \quad \text{.....(3.1)}$$

The environmental management practice (EMP) variable is defined as the sets of practices that are conducted by companies, which can be classified into several sets of dimensions (Ali et al., 2022). The dimensions of EMP on which the variable of EMP score is garnered are based on the selection of matrices, which are performed as environmental policy, environmental objectives, environmental processes, organizational structure, and environmental monitoring. All of the stipulated categories on which the EMP variable revolves are in accordance with the study of Ali et al. (2022). Subsequent to the selection of matrices and establishing whether those matrices could fit into the stipulated categories of EMP, the scores of each matrix established by SPOTT are summed up and calculated as a percentage of the total ESG score.

3. Climate Change Risk (CCR) Disclosure as Independent and Moderating Variable

According to ECB (2023), CCR disclosure is established as the documents in which companies elucidate the recognized risks relating to climate change. It amalgamates the extent of climate risks exposed by and to their business. The output of the CCR disclosure variable comprises disclosure and non-disclosure.

The illustration below outlines the scoring threshold and classification for the CCR Disclosure Score.



4. Financial Performance (FP) as Dependent Variable

Similar to Chen et al. (2022), the financial performance will be measured using return on assets (ROA), which can be explicated as the total return for the assets that the company utilized.

The dependent variable of ROA is defined as follows:

$$ROA = \frac{Net\ Income}{Total\ Assets}\% \quad \text{.....(3.2)}$$

5. Company Size as Control Variable

In order to account for differences in company size, the variable of company size is treated as a control variable (Ali et al., 2022). Firm size might indicate a higher financial capability for companies to allocate some of their resources for environmental-related investments. According to Ali et al. (2022), the size of companies might affect their valuation positively due to economies of scale. The size variable deployed within this research is proxied by Total Assets.

6. Leverage Ratio as Control Variable

The control variable of debt-to-equity ratio (DER) is utilized within this research, as also performed by Chen et al. (2022). The DER is treated as a control variable as it is expected to influence companies' financial performance. Higher financial

leverage signals a riskier financial condition as entities are obligated to fulfill their debt obligations.

The DER as a control variable is calculated as follows:

$$DER = \frac{Total\ Liabilities}{Total\ Equity}\% \quad \text{.......} \quad (3.3)$$

7. Country Effect as Control Variable

The research of Benkraiem et al. (2022) incorporated control over the country effect variable to isolate the possible impact of companies' financial performance due to the country effect. Goldszmidt et al. (2011) found that country effect positively altered firm financial performance with higher significance for those in emerging economies. Aiming to control for country effect, this research mainly utilized gross domestic product (GDP) value.

3.4 Panel Regression Model

This analysis is regarded as panel data analysis as the set of observations that this research employed consists of the amalgamation of time-series and cross-section data. Hence, model determination of the panel regression was deemed to be necessary. According to Zulfikar (2018), in order to obtain the most fitting regression model, there are some tests to be conducted to ascertain the most suitable regression models. The objective of determining the most fitting regression model is to capacitate the analysis to unveil the prevailing effects of independent variables and moderating variables towards the response variable.

One of the following models is comprehended to embody the soundest regression model (Zulfikar, 2018):

1. Common Effect Model

According to Zulfikar (2018), the common effect model (CEM) is often regarded as pooled least squares (PLS). This model is reckoned as the simplest model out of other panel regression models as it assumes that all individuals' and companies'

behaviors are similar across periods of time. This model utilizes the approach of ordinary least squares (OLS), aiming to estimate the panel data regression model.

2. Fixed Effect Model

According to Zulfikar (2018), the fixed effect model (FEM) assumes that the consistency of individuals' or companies' behavior across time is less realistic. On the other hand, this model considers the difference intercept between individuals' or companies' data due to certain factors such as managerial approach, culture, and work differences. At the same time, the slope of individuals' or companies' data across time is assumed to be constant. The assumed differences between individuals or companies are incorporated using different intercepts. The fixed effect model enables researchers to examine the effect of differences in individuals and time. This model also assumed that there was no correlation between the error terms and the dependent variable.

3. Random Effect Model

According to Zulfikar (2018), the random effect model (REM) assumes a correlation between each company's error terms. This model utilizes generalized least squares (GLS) as a means of model estimation. This model reckoned the existence of the correlation between error terms and companies and time and eliminated heteroskedasticity. This model contrasted from common effect model (CEM) and fixed effect model (FEM) as it utilizes the principle of maximum likelihood or general least square (GLS).

The methods of determining the most appropriate model to accommodate the panel regression model of our analysis are as follows:

1. Chow Test

The Chow test determines whether it is more appropriate to use common effect model (CEM) or fixed effect model (FEM) to estimate the panel data model. The hypothesis employed in determining whether to use the common effect model (CEM) or fixed effect model (FEM) in Chow Test is as follows:

H0: Common Effect Model is better than Fixed Effect Model (FEM)
H1: Fixed Effect Model is better than Common Effect Model (CEM)

Based on the hypothesis above, the F-statistics distribution is incorporated to determine which model fits the regression if the P-value is less than the chosen α (P-value < 0.05), then the H0 is rejected, and the Fixed Effect Model (FEM) is considered better than the Common Effect Model (CEM). Suppose the P-value is more than the chosen α (P-value > 0.05), then the H0 is accepted, and the Common Effect Model (CEM) is deemed to accommodate the regression model better.

2. Hausman Test

The Hausman Test is conducted to determine whether it is more fitting to use Random Effect Model (REM) or Fixed Effect Model (FEM). The hypothesis grounded in the decision-making approach is as follows:
H0: The use of the Random Effect Model (REM) is more fitting compared to the Fixed Effect Model (FEM)
H1: The use of Fixed Effect Model (FEM) is more fitting compared to Random Effect Model (REM)

Based on the defined hypothesis above, the chi-square distribution is embodied to establish the best-grounded model to study the relationships between variables. The ground rule to determine whether to accept or reject the null hypothesis is settled by observing the P-value or the value of the chi-square. If the observed chi-square value is more than chi-square table value and the P-value is less than the chosen α, it can be concluded that the null hypothesis is rejected. In contrast, if the observed chi-square value is less than the chi-square table value and the P-value is more than the chosen α, the null hypothesis will be accepted, and the use of REM is more appropriate.

As a complementary approach in determining whether to use FEM compared to REM, in the case of N (cross-section data) is significantly smaller than T (time-

series data), it can be assumed that there is no weighty gap in the estimation output from FEM and REM. Accordingly, it is suitable to use FEM due to estimation simplicity. However, if the N is more extensive compared to T and the REM assumptions are fulfilled, it can be concluded that REM is relevant for the regression model.

3. Lagrange Multiplier Test

The objective of performing the Lagrange Multiplier (LM) Test is to determine whether it is more relevant to use the Common Effect Model (CEM) or the Random Effect Model (REM). The REM was developed by Breusch-Pagan, aiming to test the significance of the residual value from the Ordinary Least Square (OLS) Method. The hypothesis involved in determining the model is as follows:

H0: The Common Effect Model (CEM) is more relevant compared to the Random Effect Model (REM)

H1: The Random Effect Model (REM) is more relevant compared to the Common Effect Model (CEM)

In the process of deciding whether to accept or reject the null hypothesis, the null hypothesis is accepted if the P-value of LM is more than the chosen α. In contrast, if the P-value of LM is less than the chosen α, the null hypothesis is rejected.

3.5 Research Instrument and Data Collection Method

The data that are incorporated within this research will be garnered from secondary data sources. The primary data sources to obtain the information for the data are SPOTT's assessment, which provides ESG scores along with detailed information relating to the company disclosure and each company's annual report ranging from 2020-2022. The SPOTT assessment and the company's annual report (AR) are accessible online. The SPOTT assessment is accessible through their dedicated website, while companies' annual reports (AR) are accessible from each companies' company's website.

The SPOTT assessment furnishes scores for each item that comprises the environmental management practices (EMP) variable and the degree of climate change risk (CCR) disclosure variable. The companies' annual reports (AR) cater to financial aspects of the companies, such as financial performance (FP). The tool for determining the relationship among variables will be STATA. As the statutory data to deliberate the relationship between independent, dependent, and moderating variables are already satisfied using the secondary data sources, the use of primary data sources as a method to collect data is undesired.

3.6 Data Analysis Method

Aiming to test the relevant relationships among the variables of interest, the multiple linear regression (MLR) for panel data analysis will be utilized as it confers the researcher the appropriate form to probe the affirmed hypothesis. Equations below exhibit the hypothetical relationships of variables that this research aims to examine:

$$ROA_{it} = \beta_0 + \beta_1 ESG_{i(t-1)} + \beta_2 ESG^2_{i(t-1)} + \beta_3 EMP_{i(t-1)} + \beta_4 ESG_{i(t-1)} \times EMP_{i(t-1)} + \beta_5 TA_{it} + \beta_6 DER_{it} + \beta_7 GDP_{it} + \mu_{it} + \varepsilon_{it} \quad \text{.....(3.4)}$$

$$ROA_{it} = \beta_0 + \beta_1 ESG_{i(t-1)} + \beta_2 ESG^2_{i(t-1)} + \beta_3 CCR_{i(t-1)} + \beta_4 ESG_{i(t-1)} \times CCR_{i(t-1)} + \beta_5 TA_{it} + \beta_6 DER_{it} + \beta_7 GDP_{it} + \varepsilon_{it} \quad \text{.....(3.5)}$$

Key Information

ROA_{it}	: Current Year Return on Assets
$ESG_{i(t-1)}$	: Lagged ESG score
$EMP_{i(t-1)}$	: Lagged Environmental Management Practice (EMP) score
$CCR_{i(t-1)}$	: Lagged Climate Change Risk (CCR) disclosure score
ε_{it}	: Error term
μ_{it}	: Individual-specific effect
β_0	: Constant
$\beta_{1,\dots,7}$	: Coefficient of Variables

3.5.1 Descriptive Statistics

Descriptive statistics are used to make decisions based on our data. The aspects involved in obtaining descriptive statistics are organizing, describing, summarizing, and presenting the data. Descriptive statistics have great importance as the first analysis of the data. The methods involved in descriptive statistics are calculating the mean, median, minimum, maximum, standard deviation, and number of observations (Ramachandran & Tsokos, 2009).

3.5.2 Classical assumption test

The classical assumption test is used to ensure the unbiasedness of the data. The classical assumption test will identify and help resolve biases in the parameters or coefficients of the variables analyzed (Wooldridge, 2016). This study will use normality test, heteroskedasticity test, and autocorrelation test as the modes of classical assumption test.

3.5.2.1 Normality test

The test of normality is conducted to ensure that the data has a normal distribution. This condition applies to both independent and dependent variables (Gujarati & Porter, 2009). The test of normality that is used in this study is the Shapiro-Wilk study which compare the gap between the expected value on the condition of normality and the order statistics (Brzezinski, 2012). The test will pass the normality or can be called to have normal distribution if the significance test value is greater than the alpha, which is 5%. However, the assumption of true normality is considered a fallacy as true data are often not normally distributed due to the nature of the data (Ghasemi & Zahediasl, 2012).

3.5.2.2 Multicollinearity Test

According to the book of Asteriou & Hall (2015), the reliability of regression results in the study approach depends on multicollinearity in panel data analysis being addressed. High levels of correlation between independent variables, or

multicollinearity, can skew coefficient estimates and make it more difficult to assess the effects of individual variables. In panel data, the Variance Inflation Factor (VIF) is a useful diagnostic tool for identifying multicollinearity. A greater VIF denotes a higher degree of correlation. The variance inflation factor (VIF) measures the degree to which multicollinearity inflates the variance of an estimated regression coefficient. When the VIF value is more than 10, it is considered concerning and is a frequently utilized threshold. Researchers may detect and reduce multicollinearity in panel data analysis by using the VIF test, which improves the validity and robustness of regression models.

3.5.2.3 Autocorrelation Test

The Wooldridge test is a powerful diagnostic technique that is used in this study to carefully address the presence of autocorrelation in the panel data analysis by evaluating the serial correlation in residuals. The association between a variable and its lagged values, or autocorrelation, has the tendency to induce bias and jeopardize the accuracy of regression estimations. By assessing the null hypothesis that there is no autocorrelation in panel regression model residuals, this test makes sure that the statistical conclusions obtained from the empirical investigations are legitimate and resilient. The Wooldridge test was used in accordance with the acknowledged importance of resolving autocorrelation issues in panel data studies (Wooldridge, 2002). This methodological technique adds to the overall rigor of the panel data analysis and strengthens the trustworthiness of the study's conclusions.

3.5.2.4 Heteroskedasticity test

The heteroskedasticity test is the method to analyze whether there is an inequality of the variance in the residuals of a model (Wooldridge, 2016). For this study, the researcher utilizes the Breusch-Pagan test for heteroskedasticity. On this test, it is assumed that the residuals of the model are conditioned in a normality distribution. This test is used because it is considered to have great applicability.

3.5.3 One-way ANOVA

The one-way analysis of variance (ANOVA) is a statistical method used to test the hypothesis that more than two populations' means are equal. Essentially, it examines whether the means of several groups are equal by comparing the variation within each group to the variation between the groups. When the variance between groups is significantly larger than the variance within groups, it suggests that the group means are different. This technique is particularly useful in situations where researchers want to assess the impact of a single factor (with three or more categories) on a continuous dependent variable. While ANOVA can identify differences among group means, post-hoc tests are often required to specify which group means are significantly different from each other (Ramachandran & Tsokos, 2009).

3.5.4 Goodness-of-fit Test

In statistical modeling, the goodness-of-fit test is used to determine how well a model fits or explains the observed data. It helps to assess the discrepancy between the observed values and the values expected under the model in question. One common measure to evaluate the goodness-of-fit in linear regression models is the R-squared, which represents the proportion of the variance in the dependent variable that is predictable from the independent variables. A higher R-squared value indicates a better fit of the model to the data, as it shows that a greater proportion of variance in the dependent variable is explained by the model Wooldridge (2016).

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3.5.5 Hypothesis test

The use of a t-test for hypothesis testing is to detect the influence of the independent variable on the dependent variable partially under the determined significance level. The null hypothesis can be rejected if the p-value from the t-test is less than the determined significance level (Wooldridge, 2016).

3.5.5.1 T-test

Wooldridge (2016) asserts that the t-test is used for hypothesis testing to identify the influence of an independent variable on the dependent variable under a certain level of significance. The null hypothesis can only be rejected if the p-value from the t-test is less than the specified level of significance.

3.5.5.2 F-test

According to Wooldridge (2016), this study employs the F-test to evaluate the collective impact of all independent variables on the dependent variable. If the p-value falls below the specified significance level, the null hypothesis of the joint effect of independent variables is rejected.

CHAPTER 4
DATA ANALYSIS AND DISCUSSION

4.1 Descriptive Statistics

Descriptive statistics provides the overview of the employed datasets, enabling the researcher to recognize the characteristics of the datasets employed in the analysis. The descriptive statistics from the variables of datasets that are analyzed within this research can be examined in Table 3 below.

Table 3. Descriptive Statistics

Variable	Obs	Mean	Std. Dev	Min	Max
Tahun	111	2021.063	0.823	2020	2022
ID	111	19.432	11.394	1	41
ROA	111	0.051	0.067	-0.139	0.246
ESG	111	0.503	0.245	0.048	0.913
EMP	111	0.169	0.088	0.008	0.331
CCR	111	0.069	0.205	0	0.75
LN_TA	111	3.74E+09	9.74E+09	272149.100	6.04E+10
DER	111	1.668	3.959	-7.175	29.31668
LN_GDP	111	6.25E+11	3.58E+11	3.34E+11	1.12E+12

The financial returns of companies proxied using Return on Assets (ROA) are found to have varied asset utilization range from -13.93% as minimum value to 24.63% as maximum value. In addition, the mean of ROA from the sample companies is 5.01%, showing that the company's financial standing status quo was not in the healthiest condition as most companies suffered from annual losses. The ESG score of sample companies exhibited an average of 50.32%. On that account, more than half of the datasets constituted in the sample of industries evinced to comply with half of the stipulated ESG matrices. The ESG score of datasets varied from 4.88% to 91.32%, with a standard deviation of 0.25.

According to the statistics, the Environmental Management Practices (EMP) and Climate-Change Risk (CCR) disclosure figures exhibited mean scores

of 16.94% and 6.98%. The EMP scores from the employed datasets indicate that the companies' involvement in management practices relating to environmental conduct varies from 0.81% to 33.2%. Moreover, the CCR disclosure score showed that only a negligible number of companies partake in climate-change risk (CCR) disclosure.

The control variables that this research employed in the analysis were aimed at controlling for the differences in company sizes, countries of origin, and capital structure. Those variables are anticipated to possess an effect on the financial performances of ROA as an explained variable in this research. The control variables are proxied by the company's Total Assets (TA), Gross Domestic Product (GDP) value of countries, and Debt-to-Equity Ratio (DER).

4.2 Panel Regression Model

As stipulated in Chapter 3 research methodology, several tests must be performed to ascertain the most fitting regression models. The tests conducted are the Chow, Hausman, and Lagrange Multiplier (LM) Tests. As the first step, the Chow Test was carried out for the two models employed within this research. The objective of the Chow Test is to determine whether it is more appropriate to use Common Effect Model (CEM) or Fixed Effect Model (FEM). By observing the Prob>F value for both models, the Chow Test outcome for both models can be seen in Table 4.

Table 4. Chow Test

Model	Pooled OLS		Fixed Effect		Chow Test		Result
	F-Stat	Prob > F	F-Stat	Prob > F	F test that all u_i=0: F(40, 64)	Prob > F	
1	4.2	0.0004	2.5	0.0312	2.19	0.0025	FEM
2	5.65	0.0000	1.65	0.147	1.67	0.0325	CEM

The Chow Test is performed by comparing the Fixed Effect and without the Fixed Effect specification for models 1 and 2. By observing the analysis output, it can be concluded that Model 1 better fits the Fixed Effect Model. The p-value from

Pooled OLS and Fixed Effect models display that both models are statistically significant. On top of that, the p-value of 0.0025 from the Chow Test indicates enough evidence to reject the null hypothesis of a significant gap of coefficients between the two models. As the p-value of Model 1 is below 0.05, the H1 for the use of the Fixed Effect Model is accepted.

For Model 2, the p-value of the Pooled OLS model displays a value of 0, which indicates that the overall model of Pooled OLS is statistically significant. The p-value of the Chow Test shows a value of 0.0325, which is lower than 0.05, which is the significance level. The p-value of the Chow Test also appears to support the H1 of the existence of a significant gap of coefficients between the two models. However, the p-value from the Fixed Effect Model displays a value of 0.147, which is higher than 0.05. It can be inferred that Model 2 does not fit the Fixed Effect Model, and the analysis fails to reject H0. In conclusion, the Pooled OLS or Common Effect Model is more appropriate for Model 1.

Table 5. Hausman Test

Model	**Hausman Test**		**Result**
	chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)	**Prob>chi2**	
1	10.91	0.0532	REM
2	14.42	0.0131	FEM

Following the Chow Test, the Hausman Test is conducted with the objective of determining whether it is more efficient to apply the Random Effect Model compared to the Fixed Effect Model. This test is imposed explicitly for Model 1 as it previously indicated a better fit for the Fixed Effect Model. The null hypothesis for this test is to conclude that using the Random Effect Model is preferred compared to the Fixed Effect Model. By observing the value of Prob>chi2 from the Hausman Test in Table 5 for Model 1, it can be inferred that it fails to reject the null hypothesis. Therefore, Model 1 is deemed to fit the Random Effect Model better due to insufficient evidence to reject the null hypothesis.

Table 6. Lagrange Multiplier Test

Model	Lagrange Multiplier Test		Result
	chibar2(01)	Prob>chibar2	
1	3.2	0.0368	REM
2	0.16	0.3468	CEM

The final test to determine the most efficient regression model is the Lagrange Multiplier (LM) Test. The null hypothesis of the LM Test is that applying the Common Effect Model is more efficient than the Random Effect Model. This test is imposed explicitly on Model 2, departing from the output of the Chow Test for the use of the Common Effect Model. By observing the Prob>chibar2 of 0.3468, which is higher than the significance level of 0.05, it can be concluded that it fails to reject the null hypothesis. Hence, Model 2 is deemed more efficient for applying the Common Effect Model.

Table 7. Panel Regression Model Decision

Model	Regression Model
1	Random Effect
2	Common Effect

Based on the test to determine the most efficient regression model for Models 1 and 2, the results are defined in Table 7. Model 1 is deemed to fit the Random Effect Model better, and the Common Effect efficiently fits Model 2.

4.3 Classical Assumption Test

Classical assumption tests are critical in research methodology for assuring statistical analyses' validity and research findings' reproducibility. These tests are intended to evaluate the fundamental assumptions of statistical models, such as normality, homoscedasticity, and independence, which are required for proper results interpretation. Normality tests, for example, look to see if the data has a normal distribution, which is a critical assumption for many parametric statistical tests. Homoscedasticity tests explore variance equality across groups or

circumstances, whereas independence tests look for the absence of correlation or dependency among data.

Researchers improve the robustness of their studies and strengthen their confidence in the generalizability of their findings by systematically analyzing these classical assumptions. Failure to address these assumptions may result in skewed results and incorrect conclusions. Although tests may differ depending on the statistical approach, paying attention to these classical assumptions is essential to sound research methodology (Field, 2013).

4.3.1 Normality Test

The normality test is conducted to observe whether the dataset residuals follow a standard distribution assumption. The Shapiro-Wilk W Test is employed to test the normality of the residuals. The output of the test can be seen in Table 8, which shows the number of observations, Prob>z value, Shapiro-Wilk test statistics (W), variance of test statistics, and z-value. Based on the given output, the Prob>z value is 0.0007, which is lower than the significance level of 0.05. The Prob>z value from the test statistics indicates that the null hypothesis of normal distribution is rejected. Therefore, the residuals of the datasets are concluded not to follow the normal distribution.

According to Buthmann (2010), non-normal data might be brought by scant data discrimination, which can be settled by collecting more observations. However, due to the limited availability of data within the context of this research, the nature of the data tends not to follow a normal distribution.

Table 8. Shapiro-Wilk W Test for Normal Data

H0: Data is Normally Distributed					
Variable	**Obs**	**W**	**V**	**z**	**Prob>z**
Residual	111	0.9535	4.186	3.195	0.0007

4.3.2 Multicollinearity Test

The multicollinearity test is performed to determine whether the independent variables employed within the models correlated with each other, which could produce skewed estimated coefficients. The method to check for multicollinearity applied within this research is the mean value of the Variance Inflation Factor (VIF). The mean values of VIF to test multicollinearity in Models 1 and 2 are specified in Table 9. In order to alleviate and reduce the multicollinearity issue, the author employs the mean-centering method for the variables that display a high correlation (Shieh, 2011).

On the first multicollinearity check for Models 1 and 2 using VIF mean value, both models showed high mean VIF values wherein they violated the maximum threshold of 10. From the first test, the variables of ESG and EMP explicated the highest correlation in both models. Subsequently, to reduce the value of mean VIF, the variables involved in interaction terms such as ESG and EMP are centralized utilizing the mean-centering method. The interaction term variable of CCR is not centralized due to the meaningful value of 0, which will alter the validity of the variable. In Table 9, the output of mean VIF for both models following the mean-centralization process shows that Model 1 still suffers from multicollinearity issues while Model 2 multicollinearity issue has been eradicated.

Table 9. Variance Inflation Factor

Model 1			**Model 2**		
Variable	**VIF**	**1/VIF**	**Variable**	**VIF**	**1/VIF**
ESG2	28.79	0.034731	**ESGCCR**	17.25	0.05796
ESGEMP	28.02	0.035693	**CCR**	13.71	0.072917
ESG	27.31	0.036617	**ESG2**	2.26	0.442571
EMP	27.26	0.03668	**ESG**	1.67	0.597692
LN_TA	1.37	0.730579	**LN_TA**	1.4	0.713728
LN_GDP	1.14	0.879154	**LN_GDP**	1.17	0.854357
DER	1.1	0.909512	**DER**	1.07	0.938699
Mean VIF	16.43		**Mean VIF**	5.51	

4.3.3 Autocorrelation Test

The test for autocorrelation employs the Wooldridge Test and is conducted for both models to determine whether there is an association between the variables and their lagged value. The null hypothesis for the Wooldridge Test is affirming that there is no first-order autocorrelation within the model. The test output prescribed in Table 10 shows the Prob>F value, which will be scrutinized. The Prob>F value of Model 1 exhibits a value of 0.0291, which is lower than the significance level of 0.05. Similarly, the Prob>F value of Model 1 displays a value of 0.0376, which is also lower than the significance level. Hence, it can be established that both models suffer from autocorrelation issues, as there is not enough evidence to reject the null hypothesis. Consequently, along the regression process, both models must incorporate robust models to alleviate the problem of classical assumption violations.

Table 10. Wooldridge Test for Autocorrelation

Ho: No First-Order Autocorrelation		
Model	**F(1,28)**	**Prob > F**
Model 1	5.289	0.0291
Model 2	4.767	0.0376

4.3.4 Heteroskedasticity Test

The Breusch-Pagan test for heteroskedasticity is exerted to scrutinize whether there is an inequality of variances within both models. Table 11 displays the output from the Breusch-Pagan Test for Model 1 and Model 2. From the given output, the chi-square statistics for Model 1 and Model 2 are 5.289 and 4.767, with Prob>chi2 of 0.0291 and 0.0376. The Prob>chi2 values from both models are below the significance level of 0.05. From the findings, it can be inferred that Model 1 and Model 2 similarly indicate a non-constant variance or heteroskedasticity. The presence of heteroskedasticity might impact the parameter's estimated efficiency. Therefore, robust standard errors will be employed in the regression to ensure the validity of the statistical outputs.

Table 11. Breusch-Pagan / Cook-Weisberg Test for Heteroskedasticity

Ho: Constant Variance		
Model	**chi2(1)**	**Prob > chi2**
Model 1	5.289	0.0291
Model 2	4.767	0.0376

4.4 One-Way ANOVA

The one-way ANOVA test is performed to test whether there is a mean difference among groups. The one-way ANOVA test employed within this research particularly examines the Prob>F value from the test. Table 12 contains the result of the performed test to examine whether there is a difference in ROA means among GDP as a group variable. From Table 12, the Prob>F value of the test statistics indicates a value of 0.2084, which is greater than the significance level of 0.05. From this value, it can be inferred that there is not enough evidence to reject the null hypothesis. In conclusion, ROA means to have no significant difference among different GDP levels.

Table 12. One-Way ANOVA Test

H0: No significant difference in the means of the groups.		
Dependent Variable	**Group Variable**	**Prob > F**
ROA	LN_GDP	0.2084

4.5 Multiple Linear Regression

Table 13 displays the regression result for Model 1 and Model 2 following the most fitting panel regression model previously determined. Model 1 uses a Random Effect Model to scrutinize the impact of the prevailing independent and employed interaction term towards ROA as a dependent variable. Model 2 examines the impact of the entailed independent variables and the interaction term to ROA utilizing the Common Effect Model as a means of estimation. Based on the preceding test on classical assumptions for Models 1 and 2, it is known that Models 1 and 2 suffer from autocorrelation and heteroskedasticity issues. Consequently, the

Heteroskedastic and Autocorrelation Robust Standard Errors were implemented on the regression of both models.

Model 1 is estimated using the Random Effect Model, deemed the most efficient estimation method for the entailed variables. The Model 1 intercept explicates a value of 0.0277473. The coefficients for the independent variables are 0.0944547 for lagged ESG, -0.2755857 for lagged ESG-squared, 0.5580249 for lagged EMP, and 0.6297721 for the interaction term of lagged ESG and EMP. In addition, the coefficients of the control variables are -1.48E^{-12} for Total Assets, -0.002737 for Debt-to-Equity Ratio, and - 1.7E^{-14} E for GDP.

Model 2 fits the estimation method of Pooled OLS or Common Effect Model. Based on the regression, the intercept of Model 2 displays a value of 0.0310514. The independent variables coefficient displays a value of 0.0310514. Moreover, the coefficients of independent variables are 0.0995508 for lagged ESG, -0.0787851 for lagged ESG-squared, -0.298296 for lagged CCR, and 0.8977525 for the interaction term between lagged ESG and CCR. Additionally, the coefficients of the control variables show a value of -1.78E^{-12} for Total Assets, -0.0035242 for Debt-to-Equity Ratio, and - 1.51E^{-14} for GDP.

Table 13. Panel Regression Result

Model 1			
Variable	**Coefficient**	**Std. Error**	**P>|t|**
ESG	-0.0944547	0.1320511	0.474
ESG2	-0.2755857	0.6600043	0.676
EMP	0.5580249	0.359691	0.121
ESGEMP	0.6297721	1.655075	0.704
LN_TA	-1.48E-12	5.56E-13	0.008**
DER	-0.002737	0.0009401	0.004**
LN_GDP	-1.7E-14	2.22E-14	0.444
_cons	0.0277473	0.0234978	0.238
R Squared	**Within**	**Between**	**Overall**
	0.1022	0.3072	0.2142
Prob > F	0.0004		
No. Obs	111		
Model 2			
Variable	**Coefficient**	**Std. Error**	**P>|t|**
ESG	0.0995508	0.0278392	0.001**
ESG2	-0.0787851	0.1302493	0.547
CCR	-0.298296	0.0937468	0.002**
ESGCCR	0.8977525	0.304467	0.004**
LN_TA	-1.78E-12	5.39E-13	0.001**
DER	-0.0035242	0.0010508	0.001**
LN_GDP	-1.51E-14	1.89E-14	0.426
Constant	0.0310514	0.0206403	0.136
R Squared	0.2775		
Prob > F	0.0000		
No. Obs	111		

4.6 Goodness-of-fit Test

The R-squared value, as estimated within the regression inferences, will be examined as a measure of goodness-of-fit. The goodness-of-fit demonstrates the independent variables' ability to influence the dependent variable's variance. A higher R-squared value signified a better fit of the model due to the independent

variables' ability to influence the independent variables' variance. The value of R-squared for Model 1 and Model 2 can be examined in Table 13.

Based on the regression inferences from Model 1, which is estimated using the Random Effect Model, the R-squared values for within, between, and overall are 0.1022, 0.3072, and 0.2142. The within and between values of 0.1022 and 0.3072 indicate that 10.22% variances in ROA as a dependent variable are explained by the independent variables within each group, and the independent variables between groups explain 30.72% variances in ROA. Accordingly, the overall R-squared value as the combination of within and between values is 21.42%, which means that the independent variables can explain 21.42% of overall variances in independent variables.

Based on the tests stipulated in the Panel Regression Model estimation, Model 2 statistical inference is estimated using the Common Effect Model. As disclosed in Table 13, the R-squared is 0.2775 for Model 2. In this case, the value of 0.2775 shows that the estimated model can explain 27.75% of the variance in the dependent variable.

4.7 Hypothesis Test

Following the regression result, the next step for this research is to perform an analysis for hypothesis testing. The significance level α on which the p-value of the statistical inferences will be examined is 0.05.

4.7.1 T-Test

The statistical significance measurement of each coefficient can be determined using the t-test of each independent variable. Each of the p-values will be compared against 0.05 as the conventional significance level. When the p-value of the variable is more significant than 0.05, it can be inferred that there is insufficient evidence to reject the null hypothesis. Furthermore, when the p-value is less than 0.05, the prevailing variable or model can be deemed statistically significant.

Model 1 statistical inferences, which can be examined in Table 13, display the p-value for the prevailing independent variables such as ESG score (ESG and ESG2), EMP Score (EMP), and an interaction term between ESG Score and EMP Score (ESGEMP). Additionally, control variables such as Total Assets (TA), Debt-to-Equity Ratio (DER), and Gross Domestic Product (GDP) value are also encompassed. Based on the statistical inferences of Model 1, the variables that manifested a p-value (Prob>F) less than 0.05 are Total Assets (TA) and Debt-to-Equity Ratio (DER). Total Assets (TA) and Debt-to-Equity Ratio (DER) p-values are 0.008 and 0.004, respectively. Hence, it can be confirmed that the Total Assets (TA) and Debt-to-Equity Ratio (DER) variables are statistically significant at 5%.

The Model 2 statistical inferences, which can be observed from Table 13, examine the model that incorporates ESG score (ESG and ESG2), Climate Change Risk Disclosure (CCR), and interaction term between ESG and CCR (ESGCCR) as independent variables. Similarly, the control variables of Total Assets (TA), Debt-to-Equity Ratio (DER), and Gross Domestic Product (GDP) are also incorporated in the regression analysis. The independent variables of ESG Score (ESG), CCR Disclosure (CCR), and the interaction terms between ESG and CCR (ESGCCR) exhibit p-values of 0.001, 0.002, and 0.004. The p-values of the mentioned independent variables are settled to be statistically significant at a 5% conventional level. Furthermore, Model 2 employed control variables such as Total Assets (TA) and Debt-to-Equity Ratio (DER), which similarly display a statistically significant level by displaying p-values of 0.001 and 0.001.

4.7.2 F-Test

The F-statistics could be employed as a measure of the model's explanatory power towards the variance of relevant dependent variables. This research has employed two different estimation approaches for Models 1 and 2 based on Chow, Hausman, and Lagrange Multiplier tests. Model 1 is estimated using the Random Effect

Model, and Model 2 is estimated using the Common Effect Model, which is postulated to be the most efficient estimation approach.

By examining the regression result in Table 13, the p-value of Prob>F for Model 1 is 0.0004 and 0.0000 for Model 2. The smaller value of Prob>F, compared to the significance level of 0.05, indicates that the employed model has better explanatory power. In summary, Model 1 and Model 2 are statistically significant and concluded to have explanatory power in affecting the dependent variable.

4.8 Discussions

Following the analysis of the regression result for Model 1 and Model 2, the following discussion will be orchestrated by the hypothesis on which this research ponders. The conclusion from each stipulated hypothesis will be established based on the regression in Table 13.

The first hypothesis examines whether the ESG Score of forestry plantation companies significantly correlates with ROA as a financial measure. From Model 1 statistical inferences, the coefficient of the ESG Score is -0.0944547 with a p-value of 0.474. The statistical output for Model 2 exhibits a coefficient of 0.0995508 and a p-value of 0.001. The difference in the coefficient signs between the two models might occur due to the estimation approach difference. It is known that Model 1 employs a Random Effect Model that takes into account the unobservable heterogeneity that is assumed to be uncorrelated with the independent variable. On the other hand, Model 2 employs a Common Effect Model that controls the individual-specific effect, which is assumed to be correlated with the independent variables.

Based on the two statistical inferences relating to answering the first hypothesis, the p-value that exhibits a significant result appeared from Model 2 of the Common Effect Model. Hence, it can be concluded that ESG Score positively and significantly correlates with ROA when the individual-specific effects are

controlled. In contrast, when the individual-specific effects are assumed to be correlated with the explanatory variable and not controlled, the p-value of ESG exhibits a non-significant and negative correlation with ROA. Due to the ESG Score in Model 2 statistical significance, the correlation of ESG towards ROA can be inferred that the first hypothesis is accepted under the condition of the Common Effect Model. Therefore, companies that realize the importance of ESG, which could be manifested in better ESG transparency and additional scores, may gradually increase their ROA by 0.0995508 or 9.96%. These findings resonate with the existing research of Goss & Roberts (2011), which incorporated a Common Effect Model in the regression design. By controlling for individual-specific effects, comprehensive ESG practices possess a positive significant relationship with financial performance. This particular finding brings forth a practical consideration for companies engaging in forestry plantation on ESG transparency to the increase of ROA.

The second hypothesis aims to scrutinize the effect of Environmental Management Practices (EMP) on ROA as the dependent variable. This hypothesis is mainly addressed by Model 1. The coefficient of EMP in Model 1 regression result displays a value of 0.5580249 with a p-value of 0.121. The p-value is greater than the significant level of 0.05, inferring that the relationship is not significant. Therefore, it can be concluded that, though positively correlated, EMP has a non-significant relationship with ROA, and the second hypothesis is rejected.

The third hypothesis examines the moderating effect of EMP and towards ROA, which can be obtained from Model 1 regression result. The coefficient shows a value of 0.6297721 and a p-value of 0.704, significantly greater than the significance level of 0.05. The p-value shows a non-significant relationship with the moderating effect of EMP, which leads to the failure to support the third hypothesis. However, based on the coefficient value, there is a positive moderating effect of EMP on the ESG performance and ROA. This result indicates that when companies engaging in the forestry plantation industry with a negative ESG

performance emphasize implementing and investing in Environmental Management Practice (EMP), their ROA will progressively increase.

The fourth hypothesis aims to investigate the effect of Climate Change Risk (CCR) Disclosure on the financial performance manifested in companies' Return on Assets (ROA). Based on the output from the Model 2 Common Effect approach, the coefficient of the CCR variable shows a value of -0.298296 and is supported with a p-value of 0.002. The p-value of the relevant explanatory variable displays a value lower than the employed conventional level of 0.05. Additionally, the relationship between CCR as the explanatory variable and ROA, which acts as the explained variable, is manifested negatively with a value of -0.298296. Therefore, when companies in the industry of forestry plantation fully disclose their Climate Change Risk, their return on assets will decrease by 0.298296 or 29.8296%. The negative correlation between CCR and ROA is similar to the finding of Clarkson et al. (2008). When companies are increasing their effort towards better disclosure of environmental risk, the entailed financial risk of companies will also likely be revealed. Notably, companies that engage in environmentally sensitive industries must be vigilant in comprehensive climate risk disclosure due to the financial harm it may cause.

The fifth hypothesis discusses the moderating effect of Climate Change Risk (CCR) on the relationship between ESG performance and companies' ROA. The interaction term coefficient between CCR and ESG on Model 2 exhibits a value of 0.8977525 and a p-value of 0.004. The p-value of the interaction term between CCR and ESG is lower than 0.05, which leads to the conclusion that the fifth hypothesis is supported due to the significance of the correlation coefficient. With the 0.8977525 coefficient, it can be interpreted that the company's CCR positively moderates the effect of ESG on the ROA of companies within the forestry plantation industry. Therefore, companies that opt for a more comprehensive CCR disclosure can generate a higher ESG score, which correlates to a higher ROA or financial performance. Companies that adopt strong ESG standards and extensive

CCR disclosure may see a synergistic improvement in their financial performance (Grewatsch & Kleindienst, 2017).

CHAPTER 5
CONCLUSION

5.1 Conclusion

This research aimed to unveil the effect of ESG performances on the financial returns of companies as measured by ESG Score, in parallel considering the moderating effects of environmental management practices (EMP) and climate-change risk (CCR) disclosure. The samples that are of interest from this research comprised companies involved in the business of palm oil, natural rubber, and forestry plantations. The observations were placed on the companies within the jurisdiction of Southeast Asia, particularly those whose headquarters are located in the Southeast Asia Technical Co-operation and Development Countries (TCDC). However, due to the unavailability of companies originating from the Philippines assessed from 2019 through 2021, the final list of countries are Indonesia, Malaysia, Singapore, Vietnam, and Thailand.

Designed to test the impact of ESG performances on the financial return of companies, this research utilized the ESG performance variables spanning from the yearly data of 2019-2021. The start of the study period is in accordance with the methodology of SPOTT as the primary ESG data source, which was revised in 2019 with a more comprehensive set of assessments.

The following are the key takeaways from the observed analysis performed in this research:

1. ESG Score and ROA

Hypothesis 1 uses Model 1 (Random Effect Model) and Model 2 (Common Effect Model) to examine the relationship between ESG Score and ROA. Model 2 shows a substantial positive association (p-value = 0.001), but Model 1 shows a non-significant negative correlation. The deduction made is that, while controlling for individual-specific variables, there is a substantial correlation between ROA and ESG Score.

2. Environmental Management Practices (EMP) and ROA

The second hypothesis explores how Environmental Management Practices (EMP) affect return on assets (ROA). By applying Model 1, the analysis shows a positive but not statistically significant association (p-value = 0.121). Thus, it is concluded that even with the positive correlation, there is no substantial link between EMP and ROA, which results in the rejection of Hypothesis 2.

3. Moderating Effect of EMP on ESG and ROA

The third hypothesis investigates how Environmental Management Practices (EMP) may moderate the relationship between ESG and ROA. Model 1's results show a non-significant association (p-value = 0.704), although the moderating impact appears to be favorable based on the coefficient. In summary, although the link between ESG and ROA is not greatly moderated by EMP, its deployment may raise ROA, especially in cases when ESG performance is subpar.

4. Climate Change Risk (CCR) Disclosure and ROA

The impact of Climate Change Risk (CCR) Disclosure on Return on Assets (ROA) is examined in Hypothesis 4. An examination of Model 2 using the Common Effect Model demonstrates a substantial negative association (p-value = 0.002). As a result, it can be concluded that complete disclosure of climate change risk is linked to a significant drop in ROA of 29.83%.

5. Moderating Effect of CCR on ESG and ROA

The moderating effect of Climate Change Risk (CCR) on the relationship between Return on Assets (ROA) and Environmental, Social, and Governance (ESG) performance is examined in Hypothesis 5. With a coefficient of 0.8977525, the analysis using Model 2 shows a significant positive moderation (p-value = 0.004). Consequently, it is concluded that CCR positively moderates the impact of ESG on ROA, suggesting that firms who disclose CCR fully may achieve higher ESG scores and better financial success.

5.2 Implications

Coming from the disclosed relationships among financial return, ESG scores, and moderating variables that are employed within this research, there are several innuendos to fellow researchers, businesses, regulators, and scholars. For other researchers, this research could be a reference to complement and further develop the studies revolving around ESG performance and financial performance indicators. As companies' ESG performances are widely dispersed by various assessors catering to different contexts, the analysis of ESG is regarded as a growing discipline. With environmental management practices (EMP) along with climate-change risk (CCR) disclosure aspects exploited as the chosen moderating variable of ESG performance towards financial performance, the fragments which the EMP variable consists of could be concluded as a weighty aspect of which the ESG studies shall focus.

This study is mainly helpful for businesses and regulators, particularly for companies that operate within the agricultural industry, predominantly within the context of palm oil, natural rubber, timber, and pulp. The market outlook for agricultural products is still on the rise and is predicted to gain traction exceptionally within Southeast Asia countries. The Southeast Asia palm oil market expects an increase of 2.5 million tons driven by Indonesian production (Channel News Asia, 2023). Malaysia accounted for a 6.8% increase in natural rubber production in March 2023 as the global market mainly relies on Southeast Asia's production (Chemanalyst, 2023). The timber plantations outlook has been diverted into two antipodes, as while the global wood demand expects a rise, the prevailing effect towards carbon emission progressively materialized (Mongabay, 2023).

For businesses, the findings revolved around environmental management practices (EMP), and disclosure of climate-change risk (CCR) would enlighten the leading corporate strategy to be orchestrated within the scope of environmental practices. This study can help businesses become cognizant of the set of impactful

and practical strategies to help them achieve better environmental performance while deriving a continuously elevated financial position. The inference is particularly aligned with the study of Panjaitan et al. (2023), which found that businesses, especially in developing economies, are more inclined toward investments and corporate strategies to achieve financial benefits.

The findings and inferences derived from this research can also be exploited to enrich the decision-making process of regulators as infrastructure and policy engineers. One of the global institutions established to assist economic development and foster collaboration among its members, the Organization for Economic Co-operation and Development, has recently published a guideline regarding policy reformation for ASEAN (OECD, 2022b). One of the main topics brought to the spotlight was environmental protection in parallel with economic development. This research may assist regulators in providing guidance over aspects to be formed as regulations with a high potential impact on the economy.

5.3 Limitations and Suggestions

This research is mainly concerned with the interconnection, which involves the ESG aspect within the scope of Southeast Asia as an emerging economy. Countries from emerging economies tend to experience more hurdles in implementing strategic action plans of ESG due to a lack of ESG data and low institutional quality (Sharma, 2023). Lack of ESG data availability and standardization was a significant limitation, particularly within the chosen research context within an emerging market such as Southeast Asia. Consequently, the studies concerning ESG within the context of emerging economies necessitate the ability to match data availability with the research purpose as a pre-requisite.

This research is mainly intended to measure the impact of explanatory variables on the financial performance of the sample of companies. However, the financial performance indicator utilized in this research is limited to return on assets (ROA). Therefore, further researchers could employ other means of financial

performance indicators to measure financial efficiency from the impact of the implemented ESG measurements.

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Appendices

Appendix 1. EMP Scale

Commodity	Date	Category	Number	Question	EMP
Palm oil	November 2021	Sustainability policy and leadership	1	Sustainable palm oil policy or commitment for all its operations?	Policy
Palm oil	November 2021	Sustainability policy and leadership	3	High-level position of responsibility for sustainability?	Organizational
Palm oil	November 2021	Sustainability policy and leadership	4	One or more members within the board of the company have responsibility for sustainability?	Organizational
Palm oil	November 2021	Sustainability policy and leadership	7	Member of multiple industry schemes or other external initiatives to reduce negative environmental or social outcomes associated with palm oil production?	Organizational
Palm oil	November 2021	Sustainability policy and leadership	8	Collaboration with stakeholders to reduce negative environmental or social outcomes associated with palm oil production?	Process
Palm oil	November 2021	Landbank, maps and traceability	30	Time-bound commitment to achieve 100% traceability to mill level?	Objective, Process
Palm oil	November 2021	Landbank, maps and traceability	32	Time-bound commitment to achieve 100% traceability to plantation level?	Objective, Process
Palm oil	November 2021	Certification standards	37	Member of the Roundtable on Sustainable Palm Oil (RSPO)?	Organizational
Palm oil	November 2021	Certification standards	38	RSPO-certified within three years of joining the RSPO or by November 2010, for companies joining prior to finalisation of the RSPO certification systems in November	Organizational
Palm oil	November 2021	Certification standards	43	Time-bound plan for achieving 100% RSPO certification of estates and mills within 5 years or achieved 100% RSPO-certification of estates?	Objective
Palm oil	November 2021	Certification standards	44	Time-bound plan for achieving 100% RSPO certification of all palm product processing facilities?	Objective
Palm oil	November 2021	Certification standards	46	Time-bound plan for achieving 100% RSPO certification of scheme/plasma/associated smallholders and outgrowers within 5 years or target already achieved?	Objective
Palm oil	November 2021	Certification standards	49	Sells RSPO-certified palm oil through Segregated or Identity Preserved supply chains?	Process
Palm oil	November 2021	Certification standards	50	Processes/trades RSPO-certified palm oil through Segregated or Identity Preserved supply chains?	Process
Palm oil	November 2021	Certification standards	51	Indonesia Sustainable Palm Oil (ISPO) certified (100%)?	Organizational
Palm oil	November 2021	Certification standards	52	Malaysia Sustainable Palm Oil (MSPO) certified?	Organizational
Palm oil	November 2021	Certification standards	53	Certified under voluntary sustainability certification scheme (e.g. ISCC, SAS, RSB)?	Organizational
Palm oil	November 2021	Deforestation and biodiversity	54	Commitment to zero conversion of natural ecosystems?	Objective
Palm oil	November 2021	Deforestation and biodiversity	55	Commitment to zero deforestation?	Objective
Palm oil	November 2021	Deforestation and biodiversity	58	Evidence of monitoring deforestation?	Monitoring
Palm oil	November 2021	Deforestation and biodiversity	59	Evidence of monitoring deforestation in supplier operations?	Monitoring
Palm oil	November 2021	Deforestation and biodiversity	62	Commitment to restoration of non-compliant deforestation/conversion?	Objective
Palm oil	November 2021	Deforestation and biodiversity	65	Biodiversity policy?	Policy
Palm oil	November 2021	Deforestation and biodiversity	69	Commitment to no hunting or only sustainable hunting of species?	Objective
Palm oil	November 2021	HCV, HCS and impact assessments	71	Commitment to conduct High Conservation Value (HCV) assessments?	Objective, Process
Palm oil	November 2021	HCV, HCS and impact assessments	73	High Conservation Value (HCV) assessments for planting undertaken prior to January 2015, and associated management and monitoring plans?	Process, Monitoring
Palm oil	November 2021	HCV, HCS and impact assessments	74	High Conservation Value (HCV) assessments for all estates planted since January 2015?	Process
Palm oil	November 2021	HCV, HCS and impact assessments	75	High Conservation Value (HCV) management and monitoring plans for all estates planted since January 2015?	Monitoring
Palm oil	November 2021	HCV, HCS and impact assessments	76	Commitment to only use licensed High Conservation Value (HCV) assessors accredited by the HCV Resource Network's Assessor Licensing Scheme (ALS)?	Process
Palm oil	November 2021	HCV, HCS and impact assessments	78	Satisfactory review of all High Conservation Value (HCV) assessments undertaken since January 2015 by the HCV ALS Quality Panel?	Monitoring
Palm oil	November 2021	HCV, HCS and impact assessments	79	Commitment to the High Carbon Stock (HCS) Approach?	Objective, Process
Palm oil	November 2021	HCV, HCS and impact assessments	81	High Carbon Stock (HCS) assessments available?	Process
Palm oil	November 2021	HCV, HCS and impact assessments	82	Peer review of all High Carbon Stock (HCS) assessments undertaken since April 2015 by the HCSA Quality Assurance Process?	Monitoring
Palm oil	November 2021	HCV, HCS and impact assessments	83	Commitment to conduct social and environmental impact assessments (SEIAs)?	Objective, Process
Palm oil	November 2021	HCV, HCS and impact assessments	85	Social and environmental impact assessments (SEIAs) available, and associated management and monitoring plans?	Process, Monitoring
Palm oil	November 2021	Peat, fire and GHG emissions	86	Commitment to no planting on peat of any depth?	Objective
Palm oil	November 2021	Peat, fire and GHG emissions	89	Implementation of commitment to no planting on peat of any depth?	Process
Palm oil	November 2021	Peat, fire and GHG emissions	90	Commitment to best management practices for soils and peat?	Organizational
Palm oil	November 2021	Peat, fire and GHG emissions	92	Evidence of best management practices for soils and peat?	Organizational, Process
Palm oil	November 2021	Peat, fire and GHG emissions	93	Commitment to zero burning?	Objective
Palm oil	November 2021	Peat, fire and GHG emissions	95	Evidence of fire monitoring and management?	Monitoring
Palm oil	November 2021	Peat, fire and GHG emissions	98	Time-bound commitment to reduce greenhouse gas (GHG) emissions intensity?	Objective
Palm oil	November 2021	Peat, fire and GHG emissions	101	Progress towards commitment to reduce GHG emissions intensity?	Process
Palm oil	November 2021	Water, chemical and pest	104	Time-bound commitment to improve water use intensity?	Objective
Palm oil	November 2021	Water, chemical and pest	106	Progress towards commitment on water use intensity?	Process
Palm oil	November 2021	Water, chemical and pest	107	Time-bound commitment to improve water quality (BOD and COD)?	Objective
Palm oil	November 2021	Water, chemical and pest	108	Progress towards commitment on water quality (BOD and COD)?	Process
Palm oil	November 2021	Water, chemical and pest	109	Treatment of palm oil mill effluent (POME)?	Process
Palm oil	November 2021	Water, chemical and pest	110	Treatment of palm oil refinery effluent (PORE)?	Process
Palm oil	November 2021	Water, chemical and pest	111	Commitment to protect natural waterways through buffer zones?	Objective
Palm oil	November 2021	Water, chemical and pest	112	Implementation of commitment to protect natural waterways through buffer zones?	Process
Palm oil	November 2021	Water, chemical and pest	113	Commitment to minimise the use of chemicals, including pesticides and chemical fertilisers?	Objective
Palm oil	November 2021	Water, chemical and pest	115	Commitment to no use of paraquat?	Objective
Palm oil	November 2021	Water, chemical and pest	117	Commitment to no use of World Health Organisation (WHO) Class 1A and 1B pesticides?	Objective
Palm oil	November 2021	Water, chemical and pest	119	Commitment to no use of chemicals listed under the Stockholm Convention and Rotterdam Convention?	Objective
Palm oil	November 2021	Water, chemical and pest	122	Implementation of commitment to minimise inorganic fertiliser use?	Process
Palm oil	November 2021	Water, chemical and pest	123	Integrated Pest Management (IPM) approach?	Process
Palm oil	November 2021	Water, chemical and pest	124	Waste management system in place to avoid negative impacts?	Process
Palm oil	November 2021	Smallholders and suppliers	165	Process used to prioritise, assess and/or engage suppliers on compliance with company's policy and/or legal requirements?	Monitoring
Palm oil	November 2021	Smallholders and suppliers	167	Suspension or exclusion criteria for suppliers?	Process
Palm oil	November 2021	Smallholders and suppliers	168	Time-bound action plans (including Key Performance Indicators) for suppliers to be in compliance with palm oil sourcing commitments?	Monitoring
Palm oil	November 2021	Smallholders and suppliers	170	Time-bound plan to engage with all high risk mills within 3 years?	Monitoring
Palm oil	November 2021	Smallholders and suppliers	173	Procedures in place to assess all own and third party supplying palm oil mills for risk level?	Process

Commodity	Date	Category	Number	Question	EMP
Palm oil	November 2020	Sustainability policy and leadership	1	Sustainable palm oil policy or commitment for all its operations?	Policy
Palm oil	November 2020	Sustainability policy and leadership	3	High-level position of responsibility for sustainability?	Organizational
Palm oil	November 2020	Sustainability policy and leadership	4	One or more members within the board of the company have responsibility for sustainability?	Organizational
Palm oil	November 2020	Sustainability policy and leadership	7	Member of multiple industry schemes or other external initiatives to reduce negative environmental or social outcomes associated with palm oil production?	Organizational
Palm oil	November 2020	Sustainability policy and leadership	8	Collaboration with stakeholders to reduce negative environmental or social outcomes associated with palm oil production?	Process
Palm oil	November 2020	Landbank, maps and traceability	30	Time-bound commitment to achieve 100% traceability to mill level?	Objective, Process
Palm oil	November 2020	Landbank, maps and traceability	32	Time-bound commitment to achieve 100% traceability to plantation level?	Objective, Process
Palm oil	November 2020	Certification standards	37	Member of the Roundtable on Sustainable Palm Oil (RSPO)?	Organizational
Palm oil	November 2020	Certification standards	38	RSPO-certified within three years of joining the RSPO or by November 2010, for companies joining prior to finalisation of the RSPO certification systems in November	Organizational
Palm oil	November 2020	Certification standards	43	Time-bound plan for achieving 100% RSPO certification of estates and mills within 5 years or achieved 100% RSPO-certification of estates?	Objective
Palm oil	November 2020	Certification standards	46	Time-bound plan for achieving 100% RSPO certification of scheme/plasma/associated smallholders and outgrowers within 5 years or target already achieved?	Objective
Palm oil	November 2020	Certification standards	49	Sells or processes/trades RSPO-certified palm oil through Segregated or Identity Preserved supply chains?	Process
Palm oil	November 2020	Certification standards	50	Indonesia Sustainable Palm Oil (ISPO) certified (100%)?	Organizational
Palm oil	November 2020	Certification standards	51	Malaysia Sustainable Palm Oil (MSPO) certified?	Organizational
Palm oil	November 2020	Certification standards	52	Certified under voluntary sustainability certification scheme (e.g. ISCC, SAS, RSB)?	Organizational
Palm oil	November 2020	Deforestation and biodiversity	53	Commitment to zero deforestation or zero conversion of natural ecosystems?	Objective
Palm oil	November 2020	Deforestation and biodiversity	56	Evidence of monitoring deforestation?	Monitoring
Palm oil	November 2020	Deforestation and biodiversity	57	Evidence of monitoring deforestation in supplier operations?	Monitoring
Palm oil	November 2020	Deforestation and biodiversity	60	Commitment to restoration of non-compliant deforestation/conversion?	Objective
Palm oil	November 2020	Deforestation and biodiversity	63	Commitment to biodiversity conservation?	Objective
Palm oil	November 2020	Deforestation and biodiversity	67	Commitment to no hunting or only sustainable hunting of species?	Objective
Palm oil	November 2020	HCV, HCS and impact assessments	69	Commitment to conduct High Conservation Value (HCV) assessments?	Objective, Process
Palm oil	November 2020	HCV, HCS and impact assessments	71	High Conservation Value (HCV) assessments for planting undertaken prior to January 2015, and associated management and monitoring plans?	Process, Monitoring
Palm oil	November 2020	HCV, HCS and impact assessments	72	High Conservation Value (HCV) assessments for all estates planted since January 2015?	Process
Palm oil	November 2020	HCV, HCS and impact assessments	73	High Conservation Value (HCV) management and monitoring plans for all estates planted since January 2015?	Monitoring
Palm oil	November 2020	HCV, HCS and impact assessments	74	Commitment to only use licensed High Conservation Value (HCV) assessors accredited by the HCV Resource Network's Assessor Licensing Scheme (ALS)?	Process
Palm oil	November 2020	HCV, HCS and impact assessments	76	Satisfactory review of all High Conservation Value (HCV) assessments undertaken since January 2015 by the HCV ALS Quality Panel?	Monitoring
Palm oil	November 2020	HCV, HCS and impact assessments	77	Commitment to the High Carbon Stock (HCS) Approach?	Objective, Process
Palm oil	November 2020	HCV, HCS and impact assessments	79	High Carbon Stock (HCS) assessments available?	Process
Palm oil	November 2020	HCV, HCS and impact assessments	80	Commitment to conduct social and environmental impact assessments (SEIAs)?	Objective, Process
Palm oil	November 2020	HCV, HCS and impact assessments	82	Social and environmental impact assessments (SEIAs) available, and associated management and monitoring plans?	Process, Monitoring
Palm oil	November 2020	Peat, fire and GHG emissions	83	Commitment to no planting on peat of any depth?	Objective
Palm oil	November 2020	Peat, fire and GHG emissions	86	Implementation of commitment to no planting on peat of any depth?	Process
Palm oil	November 2020	Peat, fire and GHG emissions	87	Commitment to best management practices for soils and peat?	Objective
Palm oil	November 2020	Peat, fire and GHG emissions	89	Evidence of best management practices for soils and peat?	Organizational, Process
Palm oil	November 2020	Peat, fire and GHG emissions	90	Commitment to zero burning?	Objective
Palm oil	November 2020	Peat, fire and GHG emissions	92	Evidence of fire monitoring and management?	Monitoring
Palm oil	November 2020	Peat, fire and GHG emissions	95	Time-bound commitment to reduce greenhouse gas (GHG) emissions intensity?	Objective
Palm oil	November 2020	Peat, fire and GHG emissions	98	Progress towards commitment to reduce GHG emissions intensity?	Process
Palm oil	November 2020	Water, chemical and pest	101	Time-bound commitment to improve water use intensity?	Objective
Palm oil	November 2020	Water, chemical and pest	103	Progress towards commitment on water use intensity?	Process
Palm oil	November 2020	Water, chemical and pest	104	Time-bound commitment to improve water quality (BOD and COD)?	Objective
Palm oil	November 2020	Water, chemical and pest	105	Progress towards commitment on water quality (BOD and COD)?	Process
Palm oil	November 2020	Water, chemical and pest	106	Treatment of palm oil mill effluent (POME)?	Process
Palm oil	November 2020	Water, chemical and pest	107	Treatment of palm oil refinery effluent (PORE)?	Process
Palm oil	November 2020	Water, chemical and pest	108	Commitment to protect natural waterways through buffer zones?	Objective
Palm oil	November 2020	Water, chemical and pest	109	Implementation of commitment to protect natural waterways through buffer zones?	Process
Palm oil	November 2020	Water, chemical and pest	110	Commitment to minimise the use of chemicals, including pesticides and chemical fertilisers?	Objective
Palm oil	November 2020	Water, chemical and pest	112	Commitment to no use of paraquat?	Objective
Palm oil	November 2020	Water, chemical and pest	114	Commitment to no use of World Health Organisation (WHO) Class 1A and 1B pesticides?	Objective
Palm oil	November 2020	Water, chemical and pest	116	Commitment to no use of chemicals listed under the Stockholm Convention and Rotterdam Convention?	Objective
Palm oil	November 2020	management	119	Implementation of commitment to minimise inorganic fertiliser use?	Process
Palm oil	November 2020	management	120	Integrated Pest Management (IPM) approach?	Process
Palm oil	November 2020	management	121	Waste management system in place to avoid negative impacts?	Process
Palm oil	November 2020	Smallholders and suppliers	163	Process used to prioritise, assess and/or engage suppliers on compliance with company's policy and/or legal requirements?	Monitoring
Palm oil	November 2020	Smallholders and suppliers	165	Suspension or exclusion criteria for suppliers?	Process
Palm oil	November 2020	Smallholders and suppliers	166	Time-bound action plans (including Key Performance Indicators) for suppliers to be in compliance with palm oil sourcing commitments?	Monitoring
Palm oil	November 2020	Smallholders and suppliers	168	Time-bound plan to engage with all high risk mills within 3 years?	Monitoring
Palm oil	November 2020	Smallholders and suppliers	171	Procedures in place to assess all own and third party supplying palm oil mills for risk level?	Process

Commodity	Date	Category	Number	Question	EMP
Palm oil	October 2019	Sustainability policy and leadership	1	Sustainable palm oil policy or commitment for all its operations?	Policy
Palm oil	October 2019	Sustainability policy and leadership	3	High-level position of responsibility for sustainability?	Organizational
Palm oil	October 2019	Sustainability policy and leadership	4	One or more members within the board of the company have responsibility for sustainability?	Organizational
Palm oil	October 2019	Sustainability policy and leadership	7	Member of multiple industry schemes or other external initiatives to reduce negative environmental or social outcomes associated with palm oil production?	Organizational
Palm oil	October 2019	Sustainability policy and leadership	8	Collaboration with stakeholders to reduce negative environmental or social outcomes associated with palm oil production?	Process
Palm oil	October 2019	Landbank, maps and traceability	31	Time-bound commitment to achieve 100% traceability to mill level?	Objective, Process
Palm oil	October 2019	Landbank, maps and traceability	33	Time-bound commitment to achieve 100% traceability to plantation level?	Objective, Process
Palm oil	October 2019	Deforestation and biodiversity	38	Commitment to zero deforestation or zero conversion of natural ecosystems?	Objective
Palm oil	October 2019	Deforestation and biodiversity	41	Evidence of monitoring deforestation?	Monitoring
Palm oil	October 2019	Deforestation and biodiversity	44	Commitment to restoration of non-compliant deforestation/conversion?	Objective
Palm oil	October 2019	Deforestation and biodiversity	47	Commitment to biodiversity conservation?	Objective
Palm oil	October 2019	Deforestation and biodiversity	51	Commitment to no hunting or only sustainable hunting of species?	Objective
Palm oil	October 2019	HCV, HCS and impact assessments	53	Commitment to conduct High Conservation Value (HCV) assessments?	Objective, Process
Palm oil	October 2019	HCV, HCS and impact assessments	55	High Conservation Value (HCV) assessments for planting undertaken prior to January 2015, and associated management and monitoring plans?	Process, Monitoring
Palm oil	October 2019	HCV, HCS and impact assessments	56	High Conservation Value (HCV) assessments for all estates planted since January 2015?	Process
Palm oil	October 2019	HCV, HCS and impact assessments	57	High Conservation Value (HCV) management and monitoring plans for all estates planted since January 2015?	Monitoring
Palm oil	October 2019	HCV, HCS and impact assessments	58	Commitment to only use licensed High Conservation Value (HCV) assessors accredited by the HCV Resource Network's Assessor Licensing Scheme (ALS)?	Process
Palm oil	October 2019	HCV, HCS and impact assessments	60	Satisfactory review of all High Conservation Value (HCV) assessments undertaken since January 2015 by the HCV ALS Quality Panel?	Monitoring
Palm oil	October 2019	HCV, HCS and impact assessments	61	Commitment to the High Carbon Stock (HCS) Approach?	Objective, Process
Palm oil	October 2019	HCV, HCS and impact assessments	63	High Carbon Stock (HCS) assessments?	Process
Palm oil	October 2019	HCV, HCS and impact assessments	64	Commitment to conduct social and environmental impact assessments (SEIAs)?	Objective, Process
Palm oil	October 2019	HCV, HCS and impact assessments	66	Social and environmental impact assessments (SEIAs) undertaken, and associated management and monitoring plans?	Process, Monitoring
Palm oil	October 2019	Peat, fire and GHG emissions	67	Commitment to no planting on peat of any depth?	Objective
Palm oil	October 2019	Peat, fire and GHG emissions	69	Implementation of commitment to no planting on peat of any depth?	Process
Palm oil	October 2019	Peat, fire and GHG emissions	71	Commitment to best management practices for soils and peat?	Objective
Palm oil	October 2019	Peat, fire and GHG emissions	73	Evidence of best management practices for soils and peat?	Organizational, Process
Palm oil	October 2019	Peat, fire and GHG emissions	74	Commitment to zero burning?	Objective
Palm oil	October 2019	Peat, fire and GHG emissions	76	Evidence of fire monitoring and management?	Monitoring
Palm oil	October 2019	Peat, fire and GHG emissions	79	Time-bound commitment to reduce greenhouse gas (GHG) emissions intensity?	Objective
Palm oil	October 2019	Peat, fire and GHG emissions	81	Progress towards commitment to reduce GHG emissions intensity?	Process
Palm oil	October 2019	management	85	Time-bound commitment to improve water use intensity?	Objective
Palm oil	October 2019	management	86	Progress towards commitment on water use intensity?	Process
Palm oil	October 2019	management	88	Time-bound commitment to improve water quality (BOD and COD)?	Objective
Palm oil	October 2019	management	89	Progress towards commitment on water quality (BOD and COD)?	Process
Palm oil	October 2019	management	90	Treatment of palm oil mill effluent (POME) and/or palm oil refinery effluent (PORE)?	Process
Palm oil	October 2019	management	91	Commitment to protect natural waterways through buffer zones?	Objective
Palm oil	October 2019	management	92	Implementation of commitment to protect natural waterways through buffer zones?	Process
Palm oil	October 2019	management	93	Commitment to minimise the use of chemicals, including pesticides and chemical fertilisers?	Objective
Palm oil	October 2019	management	95	Implementation of commitment to reduce chemical usage?	Process
Palm oil	October 2019	management	97	Commitment to no use of paraquat?	Objective
Palm oil	October 2019	management	99	Commitment to no use of World Health Organisation (WHO) Class 1A and 1B pesticides?	Objective
Palm oil	October 2019	management	101	Commitment to no use of chemicals listed under the Stockholm Convention and Rotterdam Convention?	Objective
Palm oil	October 2019	management	103	Integrated Pest Management (IPM) approach?	Process
Palm oil	October 2019	Certification standards	143	Member of the Roundtable on Sustainable Palm Oil (RSPO)?	Organizational
Palm oil	October 2019	Certification standards	144	RSPO-certified within three years of joining the RSPO or by November 2010 for companies joining prior to finalisation of the RSPO certification systems in November	Organizational
Palm oil	October 2019	Certification standards	147	Time-bound plan for achieving 100% RSPO certification of estates and mills within five years or achieved 100% RSPO-certification of estates?	Objective
Palm oil	October 2019	Certification standards	151	Time-bound plan for achieving 100% RSPO certification of scheme/plasma/ associated smallholders and outgrowers within five years or target already achieved?	Objective
Palm oil	October 2019	Certification standards	155	Sells or processes/trades RSPO-certified palm oil through Segregated or Identity Preserved supply chains?	Process
Palm oil	October 2019	Certification standards	156	Indonesia Sustainable Palm Oil (ISPO) certified (100%)?	Organizational
Palm oil	October 2019	Certification standards	157	Malaysia Sustainable Palm Oil (MSPO) certified?	Organizational
Palm oil	October 2019	Certification standards	158	Certified under voluntary sustainability certification scheme (e.g. ISCC, SAS, RSB, etc.)?	Organizational
Palm oil	October 2019	Smallholders and suppliers	164	Process used to prioritise, assess and/or engage suppliers on compliance with company's policy and/or legal requirements?	Monitoring
Palm oil	October 2019	Smallholders and suppliers	166	Time-bound plan to engage with all high-risk mills within three years?	Monitoring
Palm oil	October 2019	Smallholders and suppliers	169	Procedures in place to assess all own and third-party supplying palm oil mills for risk level?	Process
Palm oil	October 2019	Smallholders and suppliers	172	Suspension or exclusion criteria for suppliers?	Process
Palm oil	October 2019	Smallholders and suppliers	173	Time-bound action plans (including Key Performance Indicators) for suppliers to be in compliance with palm oil sourcing commitments?	Monitoring

Commodity	Date	Category	Numbe	Question	EMP
Timber and pulp	June 2021	Sustainability policy and leadership	1	Sustainable forestry policy or commitment for all its operations?	Policy
Timber and pulp	June 2021	Sustainability policy and leadership	3	High-level position of responsibility for sustainability?	Organizational
Timber and pulp	June 2021	Sustainability policy and leadership	4	One or more members within the board of the company have responsibility for sustainability?	Organizational
Timber and pulp	June 2021	Sustainability policy and leadership	7	Member of multiple industry schemes or other external initiatives to reduce negative environmental or social outcomes associated with timber and pu	Organizational
Timber and pulp	June 2021	Sustainability policy and leadership	8	Collaboration with stakeholders to reduce negative environmental or social outcomes associated with timber and pulp production?	Process
Timber and pulp	June 2021	Landbank, maps and traceability	23	Forest management plans available for all FMUs?	Organizational
Timber and pulp	June 2021	Landbank, maps and traceability	24	Monitoring of forest management plan implementation available?	Monitoring
Timber and pulp	June 2021	Landbank, maps and traceability	38	Procedures to trace raw materials to country of harvest?	Process
Timber and pulp	June 2021	Landbank, maps and traceability	40	Procedures to trace raw materials to FMU level?	Process
Timber and pulp	June 2021	Certification standards	47	Time-bound plan for achieving 100% FSC FM certification of FMUs or achieved 100% FSC-certification of FMUs?	Objective
Timber and pulp	June 2021	Certification standards	49	Commitment to source only wood/wood fibre that meets FSC Controlled Wood and/or PEFC Controlled Sources requirements?	Process
Timber and pulp	June 2021	Deforestation and biodiversity	51	Commitment to zero deforestation or zero conversion of natural ecosystems?	Objective
Timber and pulp	June 2021	Deforestation and biodiversity	54	Evidence of monitoring deforestation?	Monitoring
Timber and pulp	June 2021	Deforestation and biodiversity	58	Commitment to restoration of non-compliant deforestation/conversion?	Objective
Timber and pulp	June 2021	Deforestation and biodiversity	61	Commitment to biodiversity conservation?	Objective
Timber and pulp	June 2021	Deforestation and biodiversity	65	Commitment to no hunting or only sustainable hunting of species?	Objective
Timber and pulp	June 2021	Deforestation and biodiversity	67	Commitment to protect forest areas from illegal activities?	Objective
Timber and pulp	June 2021	Deforestation and biodiversity	70	Commitment to no use of genetically modified organisms?	Objective
Timber and pulp	June 2021	HCV, HCS and impact assessments	72	Commitment to conduct High Conservation Value (HCV) assessments?	Objective, Process
Timber and pulp	June 2021	HCV, HCS and impact assessments	74	High Conservation Value (HCV) assessments available?	Process
Timber and pulp	June 2021	HCV, HCS and impact assessments	75	High Conservation Value (HCV) management and monitoring plans available?	Monitoring
Timber and pulp	June 2021	HCV, HCS and impact assessments	76	Commitment to the High Carbon Stock (HCS) Approach?	Objective, Process
Timber and pulp	June 2021	HCV, HCS and impact assessments	78	High Carbon Stock (HCS) assessments available?	Process
Timber and pulp	June 2021	HCV, HCS and impact assessments	79	Commitment to conduct social and environmental impact assessments (SEIAs)?	Objective, Process
Timber and pulp	June 2021	HCV, HCS and impact assessments	81	Social and environmental impact assessments (SEIAs) available, and associated management and monitoring plans?	Process, Monitoring
Timber and pulp	June 2021	Soils, fire and GHG emissions	83	Commitment to no planting on peat of any depth?	Objective
Timber and pulp	June 2021	Soils, fire and GHG emissions	86	Implementation of commitment to no planting on peat of any depth?	Process
Timber and pulp	June 2021	Soils, fire and GHG emissions	87	Commitment to best management practices for soils and peat?	Organizational
Timber and pulp	June 2021	Soils, fire and GHG emissions	89	Evidence of best management practices for soils and peat?	Organizational, Process
Timber and pulp	June 2021	Soils, fire and GHG emissions	90	Commitment to reduced impact logging?	Objective
Timber and pulp	June 2021	Soils, fire and GHG emissions	92	Evidence of implementing reduced impact logging practices?	Process
Timber and pulp	June 2021	Soils, fire and GHG emissions	93	Commitment to zero burning?	Objective
Timber and pulp	June 2021	Soils, fire and GHG emissions	95	Evidence of fire monitoring and management?	Monitoring
Timber and pulp	June 2021	Soils, fire and GHG emissions	98	Time-bound commitment to reduce greenhouse gas (GHG) emissions intensity?	Objective
Timber and pulp	June 2021	Water, chemical and pest	103	Time-bound commitment to improve water use intensity?	Objective
Timber and pulp	June 2021	Water, chemical and pest	105	Progress towards commitment on water use intensity?	Process
Timber and pulp	June 2021	Water, chemical and pest	106	Time-bound commitment to improve water quality (BOD and COD)?	Objective
Timber and pulp	June 2021	Water, chemical and pest	107	Progress towards commitment on water quality (BOD and COD)?	Process
Timber and pulp	June 2021	Water, chemical and pest	108	Treatment of pulp and paper mill effluent?	Process
Timber and pulp	June 2021	Water, chemical and pest	109	Evidence of sawmill run-off containment and wastewater treatment?	Process
Timber and pulp	June 2021	Water, chemical and pest	111	Commitment to protect natural waterways through buffer zones?	Objective
Timber and pulp	June 2021	Water, chemical and pest	112	Implementation of commitment to protect natural waterways through buffer zones?	Process
Timber and pulp	June 2021	Water, chemical and pest	113	Commitment to minimise the use of chemicals, including pesticides and chemical fertilisers?	Objective
Timber and pulp	June 2021	Water, chemical and pest	115	Evidence of eliminating chlorine and chlorine compounds for bleaching?	Process
Timber and pulp	June 2021	Water, chemical and pest	116	Commitment to no use of World Health Organisation (WHO) Class 1A and 1B pesticides?	Objective
Timber and pulp	June 2021	Water, chemical and pest	118	Commitment to no use of chemicals listed under the Stockholm Convention and Rotterdam Convention?	Objective
Timber and pulp	June 2021	Water, chemical and pest	121	Implementation of commitment to reduce chemical usage?	Process
Timber and pulp	June 2021	Water, chemical and pest	122	Integrated Pest Management (IPM) approach?	Process
Timber and pulp	June 2021	Water, chemical and pest	123	Waste management system in place to avoid negative impacts?	Process
Timber and pulp	June 2021	Smallholders and suppliers	162	Percentage of outgrower scheme and/or independent smallholders involved in programme?	Process
Timber and pulp	June 2021	Smallholders and suppliers	163	Process used to prioritise, assess and/or engage suppliers on compliance with company's policy and/or legal requirements?	Monitoring
Timber and pulp	June 2021	Smallholders and suppliers	165	Suspension or exclusion criteria for suppliers?	Process
Timber and pulp	June 2021	Smallholders and suppliers	166	Timebound action plans (including Key Performance Indicators) for suppliers to be in compliance with timber and pulp sourcing commitments?	Monitoring

Commodity	Date	Category	Numbe	Question	EMP
Timber and pulp	July 2020	Sustainability policy and leadership	1	Sustainable forestry policy or commitment for all its operations?	Policy
Timber and pulp	July 2020	Sustainability policy and leadership	3	High-level position of responsibility for sustainability?	Organizational
Timber and pulp	July 2020	Sustainability policy and leadership	4	One or more members within the board of the company have responsibility for sustainability?	Organizational
Timber and pulp	July 2020	Sustainability policy and leadership	7	Member of multiple industry schemes or other external initiatives to reduce negative environmental or social outcomes associated with timber and pu	Organizational
Timber and pulp	July 2020	Sustainability policy and leadership	8	Collaboration with stakeholders to reduce negative environmental or social outcomes associated with timber and pulp production?	Process
Timber and pulp	July 2020	Landbank, maps and traceability	23	Forest management plans available for all FMUs?	Organizational
Timber and pulp	July 2020	Landbank, maps and traceability	24	Monitoring of forest management plan implementation available?	Monitoring
Timber and pulp	July 2020	Landbank, maps and traceability	38	Procedures to trace raw materials to country of harvest?	Process
Timber and pulp	July 2020	Landbank, maps and traceability	40	Procedures to trace raw materials to FMU level?	Process
Timber and pulp	July 2020	Certification standards	47	Time-bound plan for achieving 100% FSC FM certification of FMUs or achieved 100% FSC-certification of FMUs?	Objective
Timber and pulp	July 2020	Certification standards	49	Commitment to source only wood/wood fibre that meets FSC Controlled Wood and/or PEFC Controversial Sources requirements?	Objective, Process
Timber and pulp	July 2020	Deforestation and biodiversity	51	Commitment to zero deforestation or zero conversion of natural ecosystems?	Objective
Timber and pulp	July 2020	Deforestation and biodiversity	54	Evidence of monitoring deforestation?	Monitoring
Timber and pulp	July 2020	Deforestation and biodiversity	57	Commitment to restoration of non-compliant deforestation/conversion?	Objective
Timber and pulp	July 2020	Deforestation and biodiversity	60	Commitment to biodiversity conservation?	Objective
Timber and pulp	July 2020	Deforestation and biodiversity	64	Commitment to no hunting or only sustainable hunting of species?	Objective
Timber and pulp	July 2020	Deforestation and biodiversity	66	Commitment to protect forest areas from illegal activities?	Objective
Timber and pulp	July 2020	Deforestation and biodiversity	69	Commitment to no use of genetically modified organisms?	Objective
Timber and pulp	July 2020	HCV, HCS and impact assessments	71	Commitment to conduct High Conservation Value (HCV) assessments?	Objective, Process
Timber and pulp	July 2020	HCV, HCS and impact assessments	73	High Conservation Value (HCV) assessments available?	Process
Timber and pulp	July 2020	HCV, HCS and impact assessments	74	High Conservation Value (HCV) management and monitoring plans available?	Monitoring
Timber and pulp	July 2020	HCV, HCS and impact assessments	75	Commitment to the High Carbon Stock (HCS) Approach?	Objective
Timber and pulp	July 2020	HCV, HCS and impact assessments	77	High Carbon Stock (HCS) assessments available?	Process
Timber and pulp	July 2020	HCV, HCS and impact assessments	78	Commitment to conduct social and environmental impact assessments (SEIAs)?	Objective, Process
Timber and pulp	July 2020	HCV, HCS and impact assessments	80	Social and environmental impact assessments (SEIAs) available, and associated management and monitoring plans?	Process, Monitoring
Timber and pulp	July 2020	Soils, fire and GHG emissions	82	Commitment to no planting on peat of any depth?	Objective
Timber and pulp	July 2020	Soils, fire and GHG emissions	85	Implementation of commitment to no planting on peat of any depth?	Process
Timber and pulp	July 2020	Soils, fire and GHG emissions	86	Commitment to best management practices for soils and peat?	Organizational
Timber and pulp	July 2020	Soils, fire and GHG emissions	88	Evidence of best management practices for soils and peat?	Organizational, Process
Timber and pulp	July 2020	Soils, fire and GHG emissions	89	Commitment to reduced impact logging?	Objective
Timber and pulp	July 2020	Soils, fire and GHG emissions	91	Evidence of implementing reduced impact logging practices?	Process
Timber and pulp	July 2020	Soils, fire and GHG emissions	92	Commitment to zero burning?	Objective
Timber and pulp	July 2020	Soils, fire and GHG emissions	94	Evidence of fire monitoring and management?	Monitoring
Timber and pulp	July 2020	Soils, fire and GHG emissions	97	Time-bound commitment to reduce greenhouse gas (GHG) emissions intensity?	Objective
Timber and pulp	July 2020	Water, chemical and waste	102	Time-bound commitment to improve water use intensity?	Objective
Timber and pulp	July 2020	Water, chemical and waste	104	Progress towards commitment on water use intensity?	Process
Timber and pulp	July 2020	Water, chemical and waste	105	Time-bound commitment to improve water quality (BOD and COD)?	Objective
Timber and pulp	July 2020	Water, chemical and waste	106	Progress towards commitment on water quality (BOD and COD)?	Process
Timber and pulp	July 2020	Water, chemical and waste	107	Treatment of pulp and paper mill effluent?	Process
Timber and pulp	July 2020	Water, chemical and waste	108	Evidence of sawmill run-off containment and wastewater treatment?	Process
Timber and pulp	July 2020	Water, chemical and waste	110	Commitment to protect natural waterways through buffer zones?	Objective
Timber and pulp	July 2020	Water, chemical and waste	111	Implementation of commitment to protect natural waterways through buffer zones?	Process
Timber and pulp	July 2020	Water, chemical and waste	112	Commitment to minimise the use of chemicals, including pesticides and chemical fertilisers?	Objective
Timber and pulp	July 2020	Water, chemical and waste	114	Evidence of eliminating chlorine and chlorine compounds for bleaching?	Process
Timber and pulp	July 2020	Water, chemical and waste	115	Commitment to no use of World Health Organisation (WHO) Class 1A and 1B pesticides?	Objective
Timber and pulp	July 2020	Water, chemical and waste	117	Commitment to no use of chemicals listed under the Stockholm Convention and Rotterdam Convention?	Objective
Timber and pulp	July 2020	Water, chemical and waste	120	Implementation of commitment to reduce chemical usage?	Process
Timber and pulp	July 2020	Water, chemical and waste	121	Integrated Pest Management (IPM) approach?	Process
Timber and pulp	July 2020	Water, chemical and waste	122	Waste management system in place to avoid negative impacts?	Process
Timber and pulp	July 2020	Smallholders and suppliers	161	Percentage of outgrower scheme and/or independent smallholders involved in programme?	Process
Timber and pulp	July 2020	Smallholders and suppliers	162	Process used to prioritise, assess and/or engage suppliers on compliance with company's policy and/or legal requirements?	Monitoring
Timber and pulp	July 2020	Smallholders and suppliers	164	Suspension or exclusion criteria for suppliers?	Process
Timber and pulp	July 2020	Smallholders and suppliers	165	Timebound action plans (including Key Performance Indicators) for suppliers to be in compliance with timber and pulp sourcing commitments?	Monitoring

Commodity	Date	Category	Number	Question	EMP
Natural rubber	March 2021	Sustainability policy and leadership	1	Sustainable natural rubber policy or commitment for all its operations?	Policy
Natural rubber	March 2021	Sustainability policy and leadership	3	High-level position of responsibility for sustainability?	Organizational
Natural rubber	March 2021	Sustainability policy and leadership	4	One or more members within the board of the company have responsibility for sustainability?	Organizational
Natural rubber	March 2021	Sustainability policy and leadership	7	Member of multiple industry schemes or other external initiatives to reduce negative environmental or social outcomes associated with natural rubber production?	Organizational
Natural rubber	March 2021	Sustainability policy and leadership	8	Collaboration with stakeholders to reduce negative environmental or social outcomes associated with natural rubber production?	Process
Natural rubber	March 2021	Landbank, maps and traceability	18	Management plans for natural rubber production are available for all estates/management units?	Organizational
Natural rubber	March 2021	Landbank, maps and traceability	21	Commitment to traceability of the whole supply chain?	Objective, Process
Natural rubber	March 2021	Certification standards/Sustainability initiatives	22	Member of the Global Platform for Sustainable Natural Rubber (GPSNR)?	Organizational
Natural rubber	March 2021	Certification standards/Sustainability initiatives	25	Certified under voluntary sustainability certification scheme?	Organizational
Natural rubber	March 2021	Certification standards/Sustainability initiatives	26	Commitment to become 100% certified under voluntary sustainability certification scheme?	Objective
Natural rubber	March 2021	Deforestation and biodiversity	27	Commitment to zero deforestation or zero conversion of natural ecosystems?	Objective
Natural rubber	March 2021	Deforestation and biodiversity	30	Evidence of monitoring deforestation?	Monitoring
Natural rubber	March 2021	Deforestation and biodiversity	32	Commitment to restoration of non-compliant deforestation/conversion?	Objective
Natural rubber	March 2021	Deforestation and biodiversity	34	Commitment to biodiversity conservation?	Objective
Natural rubber	March 2021	Deforestation and biodiversity	37	Commitment to no hunting or only sustainable hunting of species?	Objective
Natural rubber	March 2021	Deforestation and biodiversity	38	Commitment to protect areas from illegal activities?	Objective
Natural rubber	March 2021	Deforestation and biodiversity	39	Commitment not to use genetically modified organisms?	Objective
Natural rubber	March 2021	HCV, HCS and impact assessments	40	Commitment to conduct High Conservation Value (HCV) assessments?	Objective, Process
Natural rubber	March 2021	HCV, HCS and impact assessments	41	High Conservation Value (HCV) assessments available?	Process
Natural rubber	March 2021	HCV, HCS and impact assessments	42	High Conservation Value (HCV) management and monitoring plans available?	Monitoring
Natural rubber	March 2021	HCV, HCS and impact assessments	43	Commitment to the High Carbon Stock (HCS) approach?	Objective, Process
Natural rubber	March 2021	HCV, HCS and impact assessments	44	High Carbon Stock (HCS) assessments available?	Process
Natural rubber	March 2021	HCV, HCS and impact assessments	45	Commitment to conduct social and environmental impact assessments (SEIAs)?	Objective, Process
Natural rubber	March 2021	HCV, HCS and impact assessments	46	Social and environmental impact assessment (SEIAs) undertaken, and associated management and monitoring plans?	Process, Monitoring
Natural rubber	March 2021	Soils, fire and GHG emissions	47	Commitment to no planting on peat of any depth?	Objective
Natural rubber	March 2021	Soils, fire and GHG emissions	49	Implementation of commitment to no planting on peat of any depth?	Process
Natural rubber	March 2021	Soils, fire and GHG emissions	50	Commitment to best management practices for soils and peat?	Objective
Natural rubber	March 2021	Soils, fire and GHG emissions	51	Evidence of best management practices for soils and peat?	Organizational, Process
Natural rubber	March 2021	Soils, fire and GHG emissions	52	Commitment to best/sustainable tapping practices?	Objective, Process
Natural rubber	March 2021	Soils, fire and GHG emissions	53	Evidence of best/sustainable tapping practices?	Process
Natural rubber	March 2021	Soils, fire and GHG emissions	54	Commitment to zero burning?	Objective
Natural rubber	March 2021	Soils, fire and GHG emissions	55	Evidence of fire monitoring and management?	Monitoring
Natural rubber	March 2021	Soils, fire and GHG emissions	57	Time-bound commitment to reduce greenhouse gas (GHG) emissions intensity?	Objective
Natural rubber	March 2021	Water, chemical and pest management	62	Time-bound commitment to improve water use intensity?	Objective
Natural rubber	March 2021	Water, chemical and pest management	65	Time-bound commitment to improve water quality (BOD and COD)?	Objective
Natural rubber	March 2021	Water, chemical and pest management	67	Treatment of effluents from processing facilities?	Process
Natural rubber	March 2021	Water, chemical and pest management	69	Commitment to protect natural waterways through buffer zones?	Objective
Natural rubber	March 2021	Water, chemical and pest management	70	Implementation of commitment to protect natural waterways through buffer zones?	Process
Natural rubber	March 2021	Water, chemical and pest management	72	Commitment to minimise the use of chemicals, including pesticides and chemical fertilisers?	Objective
Natural rubber	March 2021	Water, chemical and pest management	73	Commitment to no use of World Health Organisation (WHO) Class 1A and 1B pesticides?	Objective
Natural rubber	March 2021	Water, chemical and pest management	74	Commitment to no use of chemicals listed under the Stockholm Convention and Rotterdam Convention?	Objective
Natural rubber	March 2021	Water, chemical and pest management	76	Implementation of commitment to reduce chemical usage?	Process
Natural rubber	March 2021	Water, chemical and pest management	77	Integrated Pest Management (IPM) approach?	Process
Natural rubber	March 2021	Water, chemical and pest management	78	Waste management system in place to avoid negative impacts?	Process

Commodity	Date	Category	Number	Question	EMP
Natural rubber	November 2019	Sustainability policy and leadership	1	Sustainable natural rubber policy or commitment for all its operations?	Policy
Natural rubber	November 2019	Sustainability policy and leadership	3	High-level position of responsibility for sustainability?	Organizational
Natural rubber	November 2019	Sustainability policy and leadership	4	One or more members within the board of the company have responsibility for sustainability?	Organizational
Natural rubber	November 2019	Sustainability policy and leadership	7	Member of multiple industry schemes or other external initiatives to reduce negative environmental or social outcomes associated with natural rubber production?	Organizational
Natural rubber	November 2019	Sustainability policy and leadership	8	Collaboration with stakeholders to reduce negative environmental or social outcomes associated with natural rubber production?	Process
Natural rubber	November 2019	Landbank, maps and traceability	20	Management plans for natural rubber production are available for all estates/management units?	Organizational
Natural rubber	November 2019	Landbank, maps and traceability	21	Commitment to traceability of the whole supply chain?	Objective, Process
Natural rubber	November 2019	Deforestation and biodiversity	22	Commitment to zero deforestation or zero conversion of natural ecosystems?	Objective
Natural rubber	November 2019	Deforestation and biodiversity	24	Evidence of monitoring deforestation?	Monitoring
Natural rubber	November 2019	Deforestation and biodiversity	27	Commitment to biodiversity conservation?	Objective
Natural rubber	November 2019	Deforestation and biodiversity	30	Commitment to protect areas from illegal activities?	Objective
Natural rubber	November 2019	Deforestation and biodiversity	31	Commitment not to use genetically modified organisms?	Objective
Natural rubber	November 2019	HCV, HCS and impact assessments	32	Commitment to conduct High Conservation Value (HCV) assessments?	Objective, Process
Natural rubber	November 2019	HCV, HCS and impact assessments	33	High Conservation Value (HCV) assessments available?	Process
Natural rubber	November 2019	HCV, HCS and impact assessments	34	High Conservation Value (HCV) management and monitoring plans available?	Monitoring
Natural rubber	November 2019	HCV, HCS and impact assessments	35	Commitment to the High Carbon Stock (HCS) approach?	Objective, Process
Natural rubber	November 2019	HCV, HCS and impact assessments	36	Commitment to conduct social and environmental impact assessments (SEIAs)?	Objective, Process
Natural rubber	November 2019	HCV, HCS and impact assessments	37	Social and environmental impact assessment (SEIAs) undertaken, and associated management and monitoring plans?	Process, Monitoring
Natural rubber	November 2019	Soils, fire and GHG emissions	38	Commitment to no planting on peat of any depth?	Objective
Natural rubber	November 2019	Soils, fire and GHG emissions	40	Implementation of commitment to no planting on peat of any depth?	Process
Natural rubber	November 2019	Soils, fire and GHG emissions	41	Commitment to best management practices for soils and peat?	Objective
Natural rubber	November 2019	Soils, fire and GHG emissions	42	Evidence of best management practices for soils and peat?	Organizational, Process
Natural rubber	November 2019	Soils, fire and GHG emissions	43	Commitment to best/sustainable tapping practices?	Objective, Process
Natural rubber	November 2019	Soils, fire and GHG emissions	44	Evidence of best/sustainable tapping practices?	Process
Natural rubber	November 2019	Soils, fire and GHG emissions	45	Commitment to zero burning?	Objective
Natural rubber	November 2019	Soils, fire and GHG emissions	46	Evidence of management and monitoring fires?	Monitoring
Natural rubber	November 2019	Soils, fire and GHG emissions	48	Time-bound commitment to reduce greenhouse gas (GHG) emissions intensity?	Objective
Natural rubber	November 2019	Water, chemical and pest management	53	Time-bound commitment to improve water quality (BOD and COD)?	Objective
Natural rubber	November 2019	Water, chemical and pest management	55	Treatment of effluents from processing facilities?	Process
Natural rubber	November 2019	Water, chemical and pest management	57	Time-bound commitment to improve water use intensity?	Objective
Natural rubber	November 2019	Water, chemical and pest management	60	Commitment to protect natural waterways through buffer zones?	Objective
Natural rubber	November 2019	Water, chemical and pest management	61	Implementation of commitment to protect natural waterways through buffer zones?	Process
Natural rubber	November 2019	Water, chemical and pest management	63	Commitment to minimise the use of chemicals, including pesticides and chemical fertilisers?	Objective
Natural rubber	November 2019	Water, chemical and pest management	64	Commitment to no use of World Health Organisation (WHO) Class 1A and 1B pesticides?	Objective
Natural rubber	November 2019	Water, chemical and pest management	65	Commitment to no use of chemicals listed under the Stockholm Convention and Rotterdam Convention?	Objective
Natural rubber	November 2019	Water, chemical and pest management	66	Implementation of commitment to reduce chemical usage?	Process
Natural rubber	November 2019	Water, chemical and pest management	67	Integrated Pest Management (IPM) approach?	Process
Natural rubber	November 2019	Water, chemical and pest management	69	Waste management system in place to avoid negative impacts?	Process
Natural rubber	November 2019	Certification standards/Sustainability initiatives	99	Member of the Global Platform for Sustainable Natural Rubber (GPSNR)?	Organizational
Natural rubber	November 2019	Certification standards/Sustainability initiatives	101	Commitment to become 100% certified under voluntary sustainability certification scheme?	Objective
Natural rubber	November 2019	Certification standards/Sustainability initiatives	102	Certified under voluntary sustainability certification scheme?	Organizational
Natural rubber	November 2019	Smallholders and suppliers	113	Suspension or exclusion criteria for non-smallholder suppliers?	Process

Source: SPOTT (2019)

Appendix 2. Research Sample

Company Name	Year	Industry	Country	Country GDP (USD)	ESG Score (t-1)	EMP Score (t-1)	CCR (t-1)	Total Asset (USD)	DER	ROA
Astra Agro Lestari Tbk PT	2020	Palm oil	Indonesia	1.1191E+12	36.62%	11%	0	1978720157	0.44	3.22%
Austindo Nusantara Jaya Tbk PT	2020	Palm oil	Indonesia	1.1191E+12	66.60%	20%	0	631700000	0.61	-0.19%
Bakrie Sumatera Plantations Tbk PT	2020	Palm oil	Indonesia	1.1191E+12	36.48%	12%	0	539607550	-2.08	-12.59%
BLD Plantation Bhd. (BLDP)	2020	Palm oil	Malaysia	3.65178E+11	19.82%	5%	0	51230292.9	1.00	0.82%
Boustead Holdings Bhd	2020	Palm oil	Malaysia	3.65178E+11	37.74%	13%	0	294088.319	0.67	0.82%
Bumitama Agri Ltd	2020	Palm oil	Singapore	3.76837E+11	63.34%	22%	0	1298646724	0.73	7.47%
Dharma Satya Nusantara Tbk	2020	Palm oil	Indonesia	1.1191E+12	36.66%	14%	0	1007933262	1.27	3.38%
Eagle High Plantations Tbk PT	2020	Palm oil	Indonesia	1.1191E+12	45.80%	17%	0	1072006268	3.32	-7.36%
FGV Holdings Bhd	2020	Palm oil	Malaysia	3.65178E+11	59.07%	20%	0	4267512000	1.82	0.85%
First Resources Ltd	2020	Palm oil	Singapore	3.76837E+11	64.13%	21%	0	1785917000	0.59	5.43%
Genting Plantations Bhd	2020	Palm oil	Malaysia	3.65178E+11	50.88%	17%	0	2096683045	0.68	2.98%
Golden Agri Resources Ltd	2020	Palm oil	Singapore	3.76837E+11	77.68%	24%	0.75	9126380000	1.06	2.52%
Gozco Plantations Tbk PT	2020	Palm oil	Indonesia	1.1191E+12	5.30%	1%	0	152663319	0.52	-8.52%

Hap Seng Plantations Holdings Bhd	2020	Palm oil	Malaysia	3.65178E+11	65.68%	24%	0	541980234	0.27	4.14%
Indofood Agri Resources Ltd	2020	Palm oil	Singapore	3.76837E+11	51.14%	16%	0	2669088319	0.83	0.44%
IOI Corporation Bhd	2020	Palm oil	Malaysia	3.65178E+11	71.86%	25%	0	3903482280	0.75	3.60%
Kencana Agri Ltd	2020	Palm oil	Singapore	3.76837E+11	29.59%	10%	0	334435000	23.43	1.20%
Kuala Lumpur Kepong Bhd	2020	Palm oil	Malaysia	3.65178E+11	72.72%	21%	0	5025017130	0.77	4.09%
Mewah International Inc	2020	Palm oil	Singapore	3.76837E+11	52.38%	13%	0	1284185000	1.10	6.71%
QL Resources Bhd	2020	Palm oil	Malaysia	3.65178E+11	14.39%	4%	0	941773376	0.94	5.88%
Sampoerna Agro Tbk PT	2020	Palm oil	Indonesia	1.1191E+12	44.69%	15%	0	694088319	1.57	-1.97%
Sarawak Oil Palms Bhd	2020	Palm oil	Malaysia	3.65178E+11	33.08%	11%	0	1057708811	0.70	5.17%
Sawit Sumbermas Sarana Tbk PT	2020	Palm oil	Indonesia	1.1191E+12	50.56%	15%	0	909966528	1.62	4.55%
Sime Darby Plantation Bhd	2020	Palm oil	Malaysia	3.65178E+11	72.08%	25%	0	7034849708	0.74	4.55%
Triputra Agro Persada Group PT	2020	Palm oil	Indonesia	1.1191E+12	25.89%	10%	0	877775641	0.85	7.57%
TSH Resources Bhd	2020	Palm oil	Malaysia	3.65178E+11	33.11%	11%	0	787869407	0.99	2.85%
Tunas Baru Lampung Tbk PT	2020	Palm oil	Indonesia	1.1191E+12	23.52%	8%	0	1383995726	2.30	3.50%
United Plantations Bhd	2020	Palm oil	Malaysia	3.65178E+11	84.38%	25%	0	738990000	0.13	13.51%

Wilmar International Ltd	2020	Palm oil	Singapore	3.76837E+11	81.03%	27%	0.75	5.102E+10	1.39	3.31%
Bakrie Sumatera Plantations Tbk PT	2020	Natural Rubber	Indonesia	1.1191E+12	28.21%	7%	0	539607550	-2.08	-12.59%
HAGL Group	2020	Natural Rubber	Viet Nam	3.34365E+11	12.08%	2%	0	1614727961	2.72	-6.40%
Halcyon Agri	2020	Natural Rubber	Singapore	3.76837E+11	69.57%	23%	0	1.964E+10	1.62	-0.31%
Indofood Agri Resources Ltd	2020	Natural Rubber	Singapore	3.76837E+11	13.13%	2%	0	2669088319	0.83	3.95%
J.A. WATTIE Tbk	2020	Natural Rubber	Indonesia	1.1191E+12	11.25%	1%	0	248840967	13.32	-8.81%
Kirana Megatara	2020	Natural Rubber	Indonesia	1.1191E+12	21.46%	4%	0	365225115	1.48	3.85%
Sampoerna Agro Tbk PT (Hutan Ketapang Industri PT)	2020	Natural Rubber	Indonesia	1.1191E+12	72.04%	31%	0	694065527	1.57	-1.97%
Viet Nam Rubber Group (VRG)	2020	Natural Rubber	Viet Nam	3.34365E+11	42.70%	18%	0	3478453500	0.56	6.32%
Astra Agro Lestari Tbk PT	2021	Palm oil	Indonesia	1.1191E+12	41.76%	12%	0	2133326737	0.44	6.80%
Austindo Nusantara Jaya Tbk PT	2021	Palm oil	Indonesia	1.1191E+12	68.13%	22%	0	645200000	0.52	5.67%
Bakrie Sumatera Plantations Tbk PT	2021	Palm oil	Indonesia	1.1191E+12	38.24%	14%	0	579540842	-2.20	1.42%
BLD Plantation Bhd. (BLDP)	2021	Palm oil	Malaysia	3.65178E+11	25.14%	7%	0	53556324.6	0.94	0.10%

Boustead Holdings Bhd	2021	Palm oil	Malaysia	3.65178E+11	53.31%	18%	0	289403.509	0.58	5.87%
Bumitama Agri Ltd	2021	Palm oil	Singapore	3.76837E+11	68.31%	25%	0	1241122807	0.47	15.98%
Dharma Satya Nusantara Tbk	2021	Palm oil	Indonesia	1.1191E+12	75.32%	24%	0	962256842	0.95	5.39%
Eagle High Plantations Tbk PT	2021	Palm oil	Indonesia	1.1191E+12	62.63%	20%	0.5	845266526	4.85	-11.77%
FGV Holdings Bhd	2021	Palm oil	Malaysia	3.65178E+11	69.86%	25%	0	4329191600	1.50	6.50%
First Resources Ltd	2021	Palm oil	Singapore	3.76837E+11	64.84%	23%	0	1873602000	0.47	7.97%
Genting Plantations Bhd	2021	Palm oil	Malaysia	3.65178E+11	72.88%	24%	0	2112988345	0.65	5.37%
Golden Agri Resources Ltd	2021	Palm oil	Singapore	3.76837E+11	81.22%	26%	0.75	9608111000	0.96	6.27%
Gozco Plantations Tbk PT	2021	Palm oil	Indonesia	1.1191E+12	7.04%	2%	0	142768561	0.89	0.70%
Hap Seng Plantations Holdings Bhd	2021	Palm oil	Malaysia	3.65178E+11	73.72%	28%	0	571238712	0.26	9.46%
Indofood Agri Resources Ltd	2021	Palm oil	Singapore	3.76837E+11	54.95%	19%	0	2641137263	0.76	3.42%
IOI Corporation Bhd	2021	Palm oil	Malaysia	3.65178E+11	77.10%	28%	0	4256789270	0.71	8.02%
Kencana Agri Ltd	2021	Palm oil	Singapore	3.76837E+11	30.68%	12%	0	334222000	9.86	5.03%
Kuala Lumpur Kepong Bhd	2021	Palm oil	Malaysia	3.65178E+11	80.99%	30%	0	6769468614	0.98	8.73%
Mewah International Inc	2021	Palm oil	Singapore	3.76837E+11	48.30%	14%	0	1502550000	1.20	5.40%
QL Resources Bhd	2021	Palm oil	Malaysia	3.65178E+11	13.24%	3%	0	1165823379	0.90	6.72%

Sampoerna Agro Tbk PT	2021	Palm oil	Indonesia	1.1191E+12	47.75%	18%	0	684280702	1.12	8.36%
Sarawak Oil Palms Bhd	2021	Palm oil	Malaysia	3.65178E+11	45.88%	15%	0	1122767017	0.58	11.63%
Sawit Sumbermas Sarana Tbk PT	2021	Palm oil	Indonesia	1.1191E+12	54.42%	19%	0	971972637	1.27	11.02%
Sime Darby Plantation Bhd	2021	Palm oil	Malaysia	3.65178E+11	82.49%	29%	0	7313944985	0.70	8.21%
Triputra Agro Persada Group PT	2021	Palm oil	Indonesia	1.1191E+12	62.14%	20%	0	873426386	0.60	9.63%
TSH Resources Bhd	2021	Palm oil	Malaysia	3.65178E+11	59.43%	21%	0	797567480	0.82	6.11%
Tunas Baru Lampung Tbk PT	2021	Palm oil	Indonesia	1.1191E+12	14.17%	5%	0	1479578947	2.25	3.76%
United Plantations Bhd	2021	Palm oil	Malaysia	3.65178E+11	86.50%	28%	0	760188300	0.17	16.56%
Wilmar International Ltd	2021	Palm oil	Singapore	3.76837E+11	88.86%	31%	0.75	5.8718E+10	1.60	3.52%
Golden Pharos	2021	Timber and Pulp	Malaysia	3.65178E+11	23.02%	7%	0	25409488.3	0.51	0.62%
Olam International	2021	Timber and Pulp	Singapore	3.76837E+11	71.39%	23%	0	2.3757E+10	3.73	1.88%
Priceworth International	2021	Timber and Pulp	Malaysia	3.65178E+11	4.88%	1%	0	70060985	0.78	-13.94%
SLJ Global	2021	Timber and Pulp	Indonesia	1.1191E+12	17.03%	3%	0	89708022	-7.18	3.83%
TA ANN Holdings	2021	Timber and Pulp	Malaysia	3.65178E+11	24.70%	10%	0	657750327	0.54	14.31%
Toba Pulp Lestari	2021	Timber and Pulp	Indonesia	1.1191E+12	60.38%	19%	0.5	474549000	2.04	0.30%

WTK Holdings	2021	Timber and Pulp	Malaysia	3.65178E+11	18.14%	7%	0	271510184	2.34	-0.72%
Astra Agro Lestari Tbk PT	2022	Palm oil	Indonesia	1.1191E+12	39.92%	11%	0	1879151943	0.31	6.13%
Austindo Nusantara Jaya Tbk PT	2022	Palm oil	Indonesia	1.1191E+12	82.87%	30%	0.5	602600000	0.42	3.52%
Bakrie Sumatera Plantations Tbk PT	2022	Palm oil	Indonesia	1.1191E+12	34.47%	13%	0	291699454	-1.76	20.49%
BLD Plantation Bhd. (BLDP)	2022	Palm oil	Malaysia	3.65178E+11	26.56%	8%	0	53528200.2	0.91	1.49%
Boustead Holdings Bhd	2022	Palm oil	Malaysia	3.65178E+11	52.91%	18%	0	272149.052	0.48	13.90%
Bumitama Agri Ltd	2022	Palm oil	Singapore	3.76837E+11	76.76%	28%	0	1278380983	0.38	17.08%
Dharma Satya Nusantara Tbk	2022	Palm oil	Indonesia	1.1191E+12	85.89%	30%	0.75	986651397	0.88	7.86%
Eagle High Plantations Tbk PT	2022	Palm oil	Indonesia	1.1191E+12	62.46%	21%	0.5	785323996	4.96	0.10%
FGV Holdings Bhd	2022	Palm oil	Malaysia	3.65178E+11	74.20%	27%	0	4107574800	1.30	7.34%
First Resources Ltd	2022	Palm oil	Singapore	3.76837E+11	65.40%	26%	0	1832725000	0.31	18.24%
Genting Plantations Bhd	2022	Palm oil	Malaysia	3.65178E+11	72.24%	26%	0	1993983415	0.66	5.50%
Golden Agri Resources Ltd	2022	Palm oil	Singapore	3.76837E+11	78.41%	26%	0	9902072000	0.88	9.31%
Gozco Plantations Tbk PT	2022	Palm oil	Indonesia	1.1191E+12	6.66%	2%	0	131410601	0.77	3.71%
Hap Seng Plantations Holdings Bhd	2022	Palm oil	Malaysia	3.65178E+11	79.64%	27%	0	548975977	0.25	8.69%

Indofood Agri Resources Ltd	2022	Palm oil	Singapore	3.76837E+11	53.84%	18%	0	2458464889	0.65	3.44%
IOI Corporation Bhd	2022	Palm oil	Malaysia	3.65178E+11	76.39%	30%	0.75	4347257040	0.70	9.23%
Kencana Agri Ltd	2022	Palm oil	Singapore	3.76837E+11	30.21%	11%	0	299555000	8.81	0.87%
Kuala Lumpur Kepong Bhd	2022	Palm oil	Malaysia	3.65178E+11	77.90%	30%	0	6755286485	0.88	8.06%
Mewah International Inc	2022	Palm oil	Singapore	3.76837E+11	64.21%	22%	0	1696010000	1.19	6.67%
QL Resources Bhd	2022	Palm oil	Malaysia	3.65178E+11	14.26%	3%	0	1178291974	0.83	4.75%
Sampoerna Agro Tbk PT	2022	Palm oil	Indonesia	1.1191E+12	60.76%	20%	0	658079023	0.96	10.14%
Sarawak Oil Palms Bhd	2022	Palm oil	Malaysia	3.65178E+11	44.84%	15%	0	1109953757	0.42	10.30%
Sawit Sumbermas Sarana Tbk PT	2022	Palm oil	Indonesia	1.1191E+12	58.41%	20%	0	897507493	1.17	13.23%
Sime Darby Plantation Bhd	2022	Palm oil	Malaysia	3.65178E+11	83.35%	30%	0	7064394977	0.64	8.61%
Triputra Agro Persada Group PT	2022	Palm oil	Indonesia	1.1191E+12	65.05%	19%	0	933255638	0.40	21.26%
TSH Resources Bhd	2022	Palm oil	Malaysia	3.65178E+11	61.21%	20%	0	671164250	0.39	17.74%
Tunas Baru Lampung Tbk PT	2022	Palm oil	Indonesia	1.1191E+12	14.55%	5%	0	1520950851	2.46	3.39%
United Plantations Bhd	2022	Palm oil	Malaysia	3.65178E+11	86.21%	29%	0	752749200	0.14	18.26%
Wilmar International Ltd	2022	Palm oil	Singapore	3.76837E+11	91.32%	33%	0.75	6.0403E+10	1.67	4.25%
Golden Pharos	2022	Timber and Pulp	Malaysia	3.65178E+11	24.55%	8%	0	25306797.6	0.43	10.62%

Olam International	2022	Timber and Pulp	Singapore	3.76837E+11	73.10%	24%	0	2.3841E+10	2.95	1.73%
Priceworth International	2022	Timber and Pulp	Malaysia	3.65178E+11	6.06%	2%	0	81585580.8	0.51	4.77%
SLJ Global	2022	Timber and Pulp	Indonesia	1.1191E+12	26.40%	7%	0	61550680	1.76	24.63%
TA ANN Holdings	2022	Timber and Pulp	Malaysia	3.65178E+11	25.15%	10%	0	673600586	0.43	13.30%
Toba Pulp Lestari	2022	Timber and Pulp	Indonesia	1.1191E+12	72.31%	21%	0.5	467802000	2.45	-4.38%
WTK Holdings	2022	Timber and Pulp	Malaysia	3.65178E+11	19.74%	7%	0	257866157	2.23	-0.22%
Bakrie Sumatera Plantations Tbk PT	2022	Natural Rubber	Indonesia	1.1191E+12	26.83%	7%	0	291699454	-1.76	20.49%
HAGL Group	2022	Natural Rubber	Viet Nam	3.34365E+11	12.40%	2%	0	837669777	2.81	5.68%
Halcyon Agri	2022	Natural Rubber	Singapore	3.76837E+11	77.73%	27%	0	2017173000	2.06	0.70%
Indofood Agri Resources Ltd	2022	Natural Rubber	Singapore	3.76837E+11	41.89%	16%	0	2458464504	0.65	7.06%
J.A. WATTIE Tbk	2022	Natural Rubber	Indonesia	1.1191E+12	12.60%	1%	0	230622709	29.32	-8.11%
Kirana Megatara	2022	Natural Rubber	Indonesia	1.1191E+12	43.96%	14%	0	308306873	1.45	-0.62%
Sampoerna Agro Tbk PT (Hutan Ketapang Industri PT)	2022	Natural Rubber	Indonesia	1.1191E+12	72.70%	31%	0	658094314	0.96	10.15%
Viet Nam Rubber Group (VRG)	2022	Natural Rubber	Viet Nam	3.34365E+11	38.50%	19%	0	3316127907	0.47	6.06%

Appendix 3. Descriptive Statistics

```
. summarize Tahun ID ROA ESG EMP CCR TA DER GDP
```

Variable	Obs	Mean	Std. Dev.	Min	Max
Tahun	111	2021.063	.8232892	2020	2022
ID	111	19.43243	11.39427	1	41
ROA	111	.051212	.0670553	-.1393935	.2463181
ESG	112	.5031976	.2444471	.0487805	.9131937
EMP	112	.1694119	.0883458	.0081301	.3315183
CCR	112	.0698198	.2045958	0	.75
TA	111	3.74e+09	9.74e+09	272149.1	6.04e+10
DER	111	1.668651	3.959135	-7.175953	29.31668
GDP	111	6.25e+11	3.58e+11	3.34e+11	1.12e+12

Appendix 4. Chow Tests

Model 1

```
. reg ROA ESG ESG2 EMP ESGEMP TA DER GDP
```

Source	SS	df	MS		
Model	.109826243	7	.015689463	Number of obs	= 111
Residual	.384778737	103	.003735716	F(7, 103)	= 4.20
				Prob > F	= 0.0004
Total	.49460498	110	.004496409	R-squared	= 0.2220
				Adj R-squared	= 0.1692
				Root MSE	= .06112

ROA	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ESG	.1040841	.6029003	0.17	0.863	-1.091627	1.299795
ESG2	-.1596937	.5636498	-0.28	0.777	-1.27756	.9581727
EMP	.4012527	.3523557	1.14	0.257	-.2975617	1.100067
ESGEMP	.3208899	1.521349	0.21	0.833	-2.696347	3.338127
TA	-1.30e-12	7.00e-13	-1.86	0.066	-2.69e-12	8.63e-14
DER	-.0039103	.0015434	-2.53	0.013	-.0069714	-.0008493
GDP	-2.05e-14	1.73e-14	-1.18	0.239	-5.49e-14	1.39e-14
_cons	-.0017343	.1402448	-0.01	0.990	-.2798769	.2764082

```
. xtreg ROA ESG ESG2 EMP ESGEMP TA DER GDP, fe
note: GDP omitted because of collinearity

Fixed-effects (within) regression               Number of obs      =       111
Group variable: ID                              Number of groups   =        41

R-sq:                                           Obs per group:
     within  = 0.1896                                         min =         2
     between = 0.1270                                         avg =       2.7
     overall = 0.1192                                         max =         3

                                                F(6,64)            =      2.50
corr(u_i, Xb)  = -0.6754                        Prob > F           =    0.0312
```

ROA	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ESG	.0470744	1.223761	0.04	0.969	-2.397669	2.491818
ESG2	-.180714	1.119394	-0.16	0.872	-2.416961	2.055533
EMP	1.103839	.5715861	1.93	0.058	-.0380354	2.245714
ESGEMP	-.362316	2.825185	-0.13	0.898	-6.006272	5.28164
TA	-7.94e-13	3.57e-12	-0.22	0.825	-7.92e-12	6.33e-12
DER	.0023074	.0029512	0.78	0.437	-.0035883	.0082032
GDP	0	(omitted)				
_cons	-.0961299	.2709038	-0.35	0.724	-.6373224	.4450626
sigma_u	.07046899					
sigma_e	.05074097					
rho	.65855875	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(40, 64) = 2.19                     Prob > F = 0.0025
```

Model 2

```
. reg ROA ESG ESG2 CCR ESGCCR TA DER GDP
```

Source	SS	df	MS	Number of obs	=	111
				F(7, 103)	=	5.65
Model	.137262384	7	.019608912	Prob > F	=	0.0000
Residual	.357342596	103	.003469346	R-squared	=	0.2775
				Adj R-squared	=	0.2284
Total	.49460498	110	.004496409	Root MSE	=	.0589

ROA	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ESG	.1788397	.1145174	1.56	0.121	-.0482786	.405958
ESG2	-.0787851	.1230321	-0.64	0.523	-.3227903	.1652201
CCR	-.298296	.101193	-2.95	0.004	-.4989883	-.0976036
ESGCCR	.8977525	.3678041	2.44	0.016	.1682998	1.627205
TA	-1.78e-12	8.66e-13	-2.05	0.042	-3.50e-12	-6.15e-14
DER	-.0035242	.0014641	-2.41	0.018	-.0064278	-.0006205
GDP	-1.51e-14	1.70e-14	-0.89	0.376	-4.87e-14	1.86e-14
_cons	.0111024	.0259331	0.43	0.669	-.0403298	.0625346

```
. xtreg ROA ESG ESG2 CCR ESGCCR TA DER GDP, fe
note: GDP omitted because of collinearity

Fixed-effects (within) regression               Number of obs      =       111
Group variable: ID                              Number of groups   =        41

R-sq:                                           Obs per group:
     within  = 0.1342                                         min =         2
     between = 0.0711                                         avg =       2.7
     overall = 0.0809                                         max =         3

                                                F(6,64)            =      1.65
corr(u_i, Xb)  = -0.5969                        Prob > F           =    0.1470

------------------------------------------------------------------------------
         ROA |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         ESG |   .2394828   .3539296     0.68   0.501    -.4675729    .9465385
        ESG2 |   .0007611   .3320598     0.00   0.998    -.6626046    .6641268
         CCR |   .0498488   .1534529     0.32   0.746    -.2567086    .3564063
      ESGCCR |  -.2920758   .5417408    -0.54   0.592    -1.374327    .7901758
          TA |   4.00e-13   3.78e-12     0.11   0.916    -7.14e-12    7.94e-12
         DER |   .0020431    .003023     0.68   0.502    -.0039961    .0080823
         GDP |          0  (omitted)
       _cons |  -.072209    .0813689    -0.89   0.378    -.2347621     .090344
-------------+----------------------------------------------------------------
     sigma_u |  .06665467
     sigma_e |  .05244432
         rho |  .61764065   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(40, 64) = 1.67                     Prob > F = 0.0325
```

Appendix 5. Hausman Tests

Model 1

```
. hausman fe re

Note: the rank of the differenced variance matrix (5) does not equal the number of coefficients being tested (6); be sure this is what
        you expect, or there may be problems computing the test.  Examine the output of your estimators for anything unexpected and
        possibly consider scaling your variables so that the coefficients are on a similar scale.

                 ——— Coefficients ———
                   (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
                    fe           re         Difference          S.E.
-------------------------------------------------------------------------------
         ESG     .0470744     .1828936       -.1358191        1.016602
        ESG2     -.180714    -.2755858        .0948718        .9240968
         EMP     1.103839     .5580248        .5458142        .4331568
      ESGEMP     -.362316     .6297723       -.9920883        2.280334
          TA    -7.94e-13    -1.48e-12        6.83e-13        3.46e-12
         DER     .0023074     -.002737        .0050444        .0023856
-------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       10.91
                Prob>chi2 =      0.0532
                (V_b-V_B is not positive definite)
```

Model 2

```
. hausman fe re

Note: the rank of the differenced variance matrix (5) does not equal the number of coefficients being tested (6); be sure this is what
        you expect, or there may be problems computing the test.  Examine the output of your estimators for anything unexpected and
        possibly consider scaling your variables so that the coefficients are on a similar scale.

                 ——— Coefficients ———
                   (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
                    fe           re         Difference          S.E.
-------------------------------------------------------------------------------
         ESG     .2394828     .1777283        .0617545        .3296206
        ESG2     .0007611    -.0715954        .0723565        .3020904
         CCR     .0498488    -.2465334        .2963822        .1111471
      ESGCCR    -.2920758     .7315894       -1.023665        .3851062
          TA     4.00e-13    -1.76e-12        2.16e-12        3.66e-12
         DER     .0020431    -.0031044        .0051476         .002573
-------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       14.42
                Prob>chi2 =      0.0131
                (V_b-V_B is not positive definite)
```

Appendix 6. LM Tests

Model 1

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        ROA[ID,t] = Xb + u[ID] + e[ID,t]

        Estimated results:
                     |       Var     sd = sqrt(Var)
             ROA     |   .0044964       .0670553
               e     |   .0025746        .050741
               u     |   .0012338       .0351257

        Test:   Var(u) = 0
                             chibar2(01) =     3.20
                          Prob > chibar2 =   0.0368
```

Model 2

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        ROA[ID,t] = Xb + u[ID] + e[ID,t]

        Estimated results:
                     |       Var     sd = sqrt(Var)
             ROA     |   .0044964       .0670553
               e     |   .0027504       .0524443
               u     |   .0006122       .0247422

        Test:   Var(u) = 0
                             chibar2(01) =     0.16
                          Prob > chibar2 =   0.3468
```

Appendix 7. Normality Test

```
. swilk res

                    Shapiro-Wilk W test for normal data

    Variable |        Obs        W         V         z       Prob>z
-------------+-------------------------------------------------------
         res |        111    0.95354     4.186     3.195     0.00070
```

Appendix 8. Multicollinearity Test

Model 1

reg	ROA	ESG	ESG2	EMP	ESGEMP	TA	DER	GDP	
Source	|	SS	df	MS	Number	of	obs	=	111
F(7,	103)	=	4.2						
Model	|	0.109826241	7	0.01569	Prob	>	F	=	0.0004
Residual	|	0.384778739	103	0.00374	R-squared	=	0.222		
Adj	R-squared	=	0.1692						
Total	|	0.49460498	110	0.0045	Root	MSE	=	0.06112	

ROA	|	Coef.	Std.	Err.	t	P>|t|	[95%	Conf.	Interval]
ESG	|	-0.0566309	0.125617	-0.45	0.653	-0.3057627	0.1925008		
ESG2	|	-0.1596934	0.5636498	-0.28	0.778	-1.27756	0.9581732		
EMP	|	0.4012528	0.3523557	1.14	0.257	-0.2975616	1.100067		
ESGEMP	|	0.3208889	1.521349	0.21	0.833	-2.696348	3.338126		
TA	|	-1.30E-12	7.00E-13	-1.86	0.066	-2.69E-12	8.63E-14		
DER	|	-0.0039103	0.0015434	-2.53	0.013	-0.0069714	-0.0008493		
GDP	|	-2.05E-14	1.73E-14	-1.18	0.239	-5.49E-14	1.39E-14		
_cons	|	0.0387014	0.0230707	1.68	0.096	-0.007054	0.0844567		

vif

Variable	|	VIF	1/VIF
EMP	|	28.79	0.034731
ESG	|	28.02	0.035693
ESG2	|	27.31	0.036617
ESGEMP	|	27.26	0.03668
TA	|	1.37	0.730579
GDP	|	1.14	0.879154
DER	|	1.1	0.909512
Mean	VIF	|	16.43

Model 2

```
. reg ROA ESG ESG2 CCR ESGCCR TA DER GDP

      Source |       SS       df       MS              Number of obs   =       111
-------------+------------------------------           F(7, 103)       =      5.65
       Model |  .13726238     7  .01960891              Prob > F        =         0
    Residual |  .3573426    103  .00346935              R-squared       =    0.2775
-------------+------------------------------           Adj R-squared   =    0.2284
       Total |  .49460498   110  .00449641              Root MSE        =    .0589

------------------------------------------------------------------------------
         ROA |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         ESG |   .0995508   .0295828     3.37   0.001     .0408803    .1582212
        ESG2 |  -.0787851   .1230321    -0.64   0.523    -.3227903    .1652201
         CCR |   -.298296    .101193    -2.95   0.004    -.4989883   -.0976036
      ESGCCR |   .8977525   .3678041     2.44   0.016     .1682998    1.627205
          TA |  -1.78E-12   8.66E-13    -2.05   0.042    -3.50E-12   -6.15E-14
         DER |  -.0035242   .0014641    -2.41   0.018    -.0064278   -.0006205
         GDP |  -1.51E-14   1.70E-14    -0.89   0.376    -4.87E-14    1.86E-14
       _cons |   .0310514   .0238788     1.3    0.196    -.0163065    .0784094
------------------------------------------------------------------------------

. vif

    Variable |       VIF       1/VIF
-------------+----------------------
      ESGCCR |     17.25    0.05796
         CCR |     13.71    0.072917
          TA |      2.26    0.442571
         ESG |      1.67    0.597692
        ESG2 |       1.4    0.713728
         GDP |      1.17    0.854357
         DER |      1.07    0.938699
-------------+----------------------
    Mean VIF |                5.51
```

Appendix 9. Autocorrelation Test

Model 1

```
. xtserial ROA ESG ESG2 EMP ESGEMP TA DER GDP

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,      28) =      5.289
           Prob > F =      0.0291
```

Model 2

```
. xtserial ROA ESG ESG2 CCR ESGCCR TA DER GDP

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,      28) =      4.767
           Prob > F =      0.0376
```

Appendix 10. Heteroskedasticity Test

Model 1

```
. quietly reg ROA ESG ESG2 EMP ESGEMP TA DER GDP

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of ROA

chi2(1) = 1.78
Prob > chi2 = 0.1822
```

Model 2

```
. quietly reg ROA ESG ESG2 CCR ESGCCR TA DER GDP

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of ROA

chi2(1) = 0.54
Prob > chi2 = 0.4632
```

Appendix 11. One-Way ANOVA Test: ROA and GDP

```
. oneway ROA GDP

                        Analysis of Variance
    Source              SS         df      MS            F     Prob > F
------------------------------------------------------------------------
Between groups      .020473328      3    .006824443      1.54     0.2084
 Within groups      .474131652    107    .004431137
------------------------------------------------------------------------
    Total            .49460498    110    .004496409

Bartlett's test for equal variances:  chi2(3) =   8.5547  Prob>chi2 = 0.036
```

Appendix 12. Regression Analysis using REM and PLS

Model 1: REM

```
. xtreg ROA ESG ESG2 EMP ESGEMP TA DER GDP, robust

Random-effects GLS regression                   Number of obs     =       111
Group variable: ID                              Number of groups  =        41

R-sq:                                           Obs per group:
     within  = 0.1022                                         min =         2
     between = 0.3072                                         avg =       2.7
     overall = 0.2142                                         max =         3

                                                Wald chi2(5)      =         .
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =         .

                                  (Std. Err. adjusted for 41 clusters in ID)
```

ROA	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
ESG	.1828936	.7160325	0.26	0.798	-1.220504	1.586292
ESG2	-.2755858	.6600041	-0.42	0.676	-1.56917	1.017998
EMP	.5580248	.359691	1.55	0.121	-.1469566	1.263006
ESGEMP	.6297723	1.655074	0.38	0.704	-2.614114	3.873658
TA	-1.48e-12	5.56e-13	-2.65	0.008	-2.57e-12	-3.86e-13
DER	-.002737	.0009401	-2.91	0.004	-.0045796	-.0008943
GDP	-1.70e-14	2.22e-14	-0.77	0.444	-6.05e-14	2.65e-14
_cons	-.0420332	.1595589	-0.26	0.792	-.3547628	.2706964
sigma_u	.03512568					
sigma_e	.05074097					
rho	.32396648	(fraction of variance due to u_i)				


```
. reg ROA ESG ESG2 EMP ESGEMP TA DER GDP
```

Source	SS	df	MS		
Model	.109826243	7	.015689463	Number of obs	= 111
Residual	.384778737	103	.003735716	F(7, 103)	= 4.20
Total	.49460498	110	.004496409	Prob > F	= 0.0004
				R-squared	= 0.2220
				Adj R-squared	= 0.1692
				Root MSE	= .06112

ROA	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ESG	.1040841	.6029003	0.17	0.863	-1.091627	1.299795
ESG2	-.1596937	.5636498	-0.28	0.777	-1.27756	.9581727
EMP	.4012527	.3523557	1.14	0.257	-.2975617	1.100067
ESGEMP	.3208899	1.521349	0.21	0.833	-2.696347	3.338127
TA	-1.30e-12	7.00e-13	-1.86	0.066	-2.69e-12	8.63e-14
DER	-.0039103	.0015434	-2.53	0.013	-.0069714	-.0008493
GDP	-2.05e-14	1.73e-14	-1.18	0.239	-5.49e-14	1.39e-14
_cons	-.0017343	.1402448	-0.01	0.990	-.2798769	.2764082

Model 2: PLS

```
. reg ROA ESG ESG2 CCR ESGCCR TA DER GDP, robust

Linear regression                               Number of obs     =        111
                                                F(5, 103)         =          .
                                                Prob > F          =          .
                                                R-squared         =     0.2775
                                                Root MSE          =     .0589
```

ROA	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ESG	.1788397	.1271817	1.41	0.163	-.0733952	.4310747
ESG2	-.0787851	.1302493	-0.60	0.547	-.3371039	.1795337
CCR	-.298296	.0937468	-3.18	0.002	-.4842207	-.1123713
ESGCCR	.8977525	.304467	2.95	0.004	.2939141	1.501591
TA	-1.78e-12	5.39e-13	-3.30	0.001	-2.85e-12	-7.10e-13
DER	-.0035242	.0010508	-3.35	0.001	-.0056082	-.0014401
GDP	-1.51e-14	1.89e-14	-0.80	0.426	-5.25e-14	2.23e-14
_cons	.0111024	.0318627	0.35	0.728	-.0520897	.0742945

```
. reg ROA ESG ESG2 CCR ESGCCR TA DER GDP
```

Source	SS	df	MS		
Model	.137262384	7	.019608912	Number of obs	= 111
Residual	.357342596	103	.003469346	F(7, 103)	= 5.65
Total	.49460498	110	.004496409	Prob > F	= 0.0000
				R-squared	= 0.2775
				Adj R-squared	= 0.2284
				Root MSE	= .0589

ROA	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ESG	.1788397	.1145174	1.56	0.121	-.0482786	.405958
ESG2	-.0787851	.1230321	-0.64	0.523	-.3227903	.1652201
CCR	-.298296	.101193	-2.95	0.004	-.4989883	-.0976036
ESGCCR	.8977525	.3678041	2.44	0.016	.1682998	1.627205
TA	-1.78e-12	8.66e-13	-2.05	0.042	-3.50e-12	-6.15e-14
DER	-.0035242	.0014641	-2.41	0.018	-.0064278	-.0006205
GDP	-1.51e-14	1.70e-14	-0.89	0.376	-4.87e-14	1.86e-14
_cons	.0111024	.0259331	0.43	0.669	-.0403298	.0625346