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TITOLO TESI:

OIL AND GAS SUSTAINABILITY: UNDERSTANDING REGIONAL DIFFERENCES AND DETERMINANTS OF SUSTAINABILITY PERFORMANCE

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DEDICATION

I dedicate this thesis to my adorable daughter, Fablexina Sesi Shitsi, and wife Mrs. Matilda Tsekpokumah Shitsi.

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ASTRATTO

Questo studio ha analizzato i determinanti del reporting di sostenibilità e delle prestazioni di sostenibilità delle società petrolifere e del gas (O&G) in quattro regioni: America, Asia, Europa e Oceania, ed ha esaminato le differenze nelle prestazioni di sostenibilità delle società in queste regioni. Questo studio è motivato dalla lacuna nella letteratura. Nello specifico, la mancanza di studi regionali sulla sostenibilità aziendale del settore O&G, nonostante il potenziale di crescita del settore nel contribuire all'agenda di sostenibilità globale attraverso operazioni sostenibili. Da qui la necessità che uno studio regionale funga da curva di apprendimento per le imprese a basso rendimento e senza reporting. Il crescente dibattito sulla rendicontazione obbligatoria richiedeva uno studio globale.

Lo studio ha analizzato i dati secondari dell'azienda su 161 aziende O&G in quattro regioni, trenta paesi e in tre industrie del settore petrolifero e del gas per un periodo di 8 anni, dal 2014 al 2021, recuperati dal database Refinitiv DataStream, dati sulla politica ambientale da Database OCSE e dati sulla segnalazione obbligatoria dal database Carrots and Sticks. Lo studio utilizza un disegno di ricerca comparativa per identificare i fattori che contribuiscono alle differenze osservate nelle prestazioni di sostenibilità tra le società petrolifere e del gas in diverse regioni. L'analisi di scomposizione Blinder-Oaxaca è stata utilizzata per esaminare le differenze nelle prestazioni di sostenibilità e le determinanti delle differenze spiegate.

In particolare, le società del settore O&G reporting superano costantemente le controparti non reporting in termini di punteggi ESG e mostrano controversie ESG inferiori a livello globale. Ciò include punteggi ambientali, sociali e di governance (ESG) e controversie ESG, rispetto alle loro controparti non reporting. Le società del settore O&G in Europa hanno dominato nei punteggi ESG e nei punteggi del pilastro sociale, mentre le società O&G in Asia sono in testa ai punteggi del pilastro ambientale, seguite dall'Europa. Le Americhe hanno riportato il punteggio più alto per il pilastro della governance. Lo studio ha inoltre rilevato che le società O&G che hanno ottenuto buoni risultati in termini ESG hanno un'alta probabilità di rendicontare i propri impatti sulla sostenibilità.

Lo studio approfondisce i determinanti della performance di sostenibilità, rivelando relazioni sfumate. Gli indicatori di governance si allineano con le teorie delle agenzie e delle parti interessate, sottolineando la correlazione positiva tra i diversi comitati consiliari e le prestazioni di sostenibilità. È interessante notare che i fattori istituzionali e il CEOBm mancano di significato a livello globale, sfidando le ipotesi convenzionali. L'adozione delle linee guida GRI emerge come un'influenza positiva globale, evidenziandone l'importanza universale. I revisori esterni, in particolare le aziende Top-4, hanno un impatto significativo sulle prestazioni di sostenibilità a livello globale, con "altri revisori non-Top4" che svolgono ruoli importanti nelle Americhe e in Oceania. Si è riscontrato che le società di esplorazione e produzione O&G ottengono risultati significativamente inferiori rispetto alle società integrate, sottolineando le vulnerabilità ambientali del settore.

Nell'esplorare le differenze regionali, lo studio identifica i principali fattori predittivi che influenzano i divari di performance di sostenibilità tra le società O&G nelle Americhe, Asia, Europa e Oceania. Lo stato del reporting di sostenibilità, la governance aziendale e fattori come le dimensioni del consiglio di amministrazione, l'adozione delle linee guida GRI e l'utilizzo dei revisori dei Top-4 emergono come fattori che contribuiscono in modo significativo alle variazioni delle prestazioni di sostenibilità a livello regionale. Nel complesso, questi risultati forniscono una comprensione completa delle pratiche di sostenibilità, delle strutture di governance e delle influenze esterne nel settore O&G, offrendo preziosi spunti per le parti interessate del settore e i responsabili politici. La rendicontazione obbligatoria non è stata significativa nel determinare le prestazioni di sostenibilità.

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Introduction

1.1 Background and Context

Oil and gas (O&G) operations comprise of upstream, midstream, and downstream activities. The upstream activities include exploration and development, drilling, extraction, and production. The midstream activities comprise mainly of storage, process, and shipping or transportation, and the downstream activities consists of refining, selling, and distributing of the product. The upstream sector also known as the Exploration and Production (E&P) with primary focus on exploration and production of crude oil and natural gas, while the downstream sector apart from refining and processing ensures that the O&G products gets to the final consumer. The midstream sector is responsible for the transportation of crude oil and natural gas from the production site to the refineries and processing facilities. They serve as a direct link between the downstream and upstream with the O&G supply chain. Together, these three sectors form the O&G industry value chain (Mojarad et al., 2018). Therefore, O&G company refers to any company that undertake any of these activities within the three sectors assuming its name according to its core functionality. Hence, an umbrella name for O&G company in the primary phase of the O&G value chain (upstream) is termed O&G E&P. Those in the upstream are generally called the O&G Refining and Marketing (R&M) companies. A hybrid where a company is involved in two or more phases of the O&G value chain is called the integrated company, here forth, the O&G Integrated. The current study focuses on the O&G E&P, O&G R&M, and the O&G Integrated.

The industry is dominated by a small number of large, vertically integrated companies known as national oil companies (NOCs) and international oil companies (IOCs). These companies control a significant portion of the world's O&G reserves and are involved in all aspects of the industry, including exploration, production, transportation, refining, and marketing. In addition to these major players, there are also numerous smaller companies that provide specialized services or operate in specific geographic regions.

The O&G sector is one of the largest industries in the world, with a significant impact on the global economy. Over the past decade, the O&G sector has grown significantly, becoming a critical industry that powers economies worldwide. In 2019, the global oil production was approximately 94.7 million barrels per day, while natural gas production reached about 3.9 trillion cubic meters, with the Americas and Asia contributing the most (Aizarani, 2023). The Americas accounted for almost half of the global oil production and a third of global natural gas production, while Asia accounted for a third of both global oil production and global natural gas production. In terms of consumption, the Asia-Pacific region was the biggest consumer of O&G globally. In 2019, Asia consumed about 34% of the world's oil and 56% of the world's natural gas. Meanwhile, Europe and the Americas also had significant O&G consumption, accounting for roughly 24% and 20% of global oil consumption and 21% and 16% of global natural gas consumption, respectively (Aizarani, 2023).

Notably the O&G sector has been a crucial industry for decades, driving economies globally and providing energy to sustain people's way of life. However, it has a history of major incidents, including the Santa Barbara oil spill in 1969 and the Deepwater Horizon disaster in 2010. Companies in the sector have been involved in environmental and human rights controversies in various regions worldwide. For example, Shell's operations in Nigeria in the 1990s polluted the river and caused tension with local citizens in the Ogoni region, and in 2003, indigenous residents in Ecuador sued Chevron for polluting the Amazon rainforest and its impact on their health.

Due to the high-risk nature of their activities, companies in the O&G industry have been under the policy radar for the past few decades, with policymakers and stakeholders demanding more accountability and transparency from the industry. In recent years however, the industry has taken steps to improve its sustainability practices (Orazalin & Mahmood, 2018a), disclosing their impact through sustainability reporting, and are striving to minimize their negative impacts on the environment and people (Schneider et al., 2013). This makes sustainability reporting and sustainability performance an increasingly important practice for companies operating in the sector.

1.1.1 Oil and Gas and Global Sustainability

Oil and gas are among the most significant resources in the world, powering modern economies and shaping the political landscape of many countries. However, the production and consumption of O&G have also been linked to various environmental and social issues, including climate change, air pollution, water pollution, and human rights abuses. As a result, there is an increasing need to address these issues and achieve sustainable development in the O&G industry.

Corporate sustainability, which refers to the integration of economic, environmental, and social considerations into business decision-making and operations, has emerged as a critical framework for achieving sustainable development in various industries, including O&G. Many O&G companies have recognized the importance of corporate sustainability and have taken steps to improve their sustainability performance through various initiatives, such as sustainability reporting, stakeholder engagement, and sustainability management systems.

There are also significant differences in sustainability performance across the regions. Europe generally has more stringent environmental regulations and is generally more proactive in addressing environmental and social issues. As a result, companies in Europe tend to have higher sustainability performance compared to companies in other regions. In contrast, companies in Asia generally have lower sustainability performance, except for Japan and South Korea, which have relatively high sustainability performance compared to other countries in the region (Aizarani, 2023). This assertion raises questions in the midst of growing regulations on sustainability across the world, the increasing concerns for non-financial accounting of corporate activities vis-à-vis the role of external auditors, and the increasing demands on

corporate boards. Three critical among many questions are: One, what accounts for the differences in the sustainability practices (reporting) and performance of O&G companies across regions? Second, does sustainability reporting influence sustainability performance and vice versa? Third, what role does corporate governance, policy in terms of mandating reporting, and the quality of auditing in promoting sustainability reporting and performance.

However, there is still a lack of understanding about the differences in sustainability reporting and performance among O&G companies operating in different regions of the world. This gap in knowledge is particularly relevant given the current economic, sustainability, and climate situations, and the need for a more comprehensive and comparative understanding of the effectiveness of corporate sustainability in the O&G industry.

While global sustainability agenda calls for institutional, national, and regional collaboration toward promoting a sustainable environment for the current and future generation, the discussion around corporate sustainability has for many years been limited to the firms, and at most, country-context. However, the global agenda towards sustainabile developmet require global partnership between corporate industry players, institutions, and governments.

Overall, these regional differences in sustainability reporting and performance have significant implications for the industry and for society, and require investigating. More so, to promote the global sustainability agenda, it is important to understand the factors that account for differences in sustainability beyond geographical differences because the differences in sustainability reporting and performance have important implications for the global economy. For example, a 2020 report by MSCI[1] found that companies with better sustainability performance were more likely to outperform their peers in terms of stock market returns, and that investors are increasingly focused on sustainability issues.

1.2 Research Motivation and Objectives

This study addresses the global call for sustainability reporting, emphasizing its importance in regional contexts often overlooked. It underscores the need to explore the efficacy of mandatory reporting versus voluntary practices, drawing attention to the global debate. Despite increased sustainability reporting, there is a significant knowledge gap regarding regional disparities in O&G sector performance. The study aims to bridge this gap, offering insights crucial for policymakers, industry players, and stakeholders to understand factors influencing sustainability performance across regions.

Debates on mandating versus voluntary reporting have received attention, yet empirical backing on the impact of regulation on the reporting-performance relationship is lacking. According to a 2020 report by the Global Reporting Initiative (GRI) which develops sustainability reporting standards, even though the number of companies publishing sustainability reports in recent years have significantly increased, a push for mandatory reporting can be more effective in ensuring that companies are held accountable for their

[1] https://www.msci.com/2020-annual-report

sustainability performance. This is an important policy that can be better assessed in a panel study of O&G sustainability practices and performance across regions.

The study advocates for a comprehensive examination of internal and external drivers, such as corporate strategic decisions and external audit practices, contributing to a nuanced understanding of sustainability performance dynamics. Given the rising global demand for O&G, accountability and improved sustainability practices are imperative. Identifying factors contributing to regional differences provides actionable insights for companies to enhance their practices.

Empirical studies on sustainability reporting and performance in the O&G sector has been ongoing for the past decade (Bashiru et al., 2022; Blessed & Inuwa, 2019; Elhuni & Ahmad, 2017; Gaudencio et al., 2020; Nwobu, et al., 2021; Okeke, 2021; Orazalin et al., 2019; Orazalin & Mahmood, 2018; Ovadia, 2012; Schneider et al., 2013). However, the research explores the complex relationship between sustainability reporting and performance, considering institutional factors, corporate governance, and external audit quality. It emphasizes the roles of mandatory reporting, auditor quality, and corporate governance in shaping the effectiveness of sustainability reporting on performance. With a focus on the Americas, Asia, Europe, and Oceania, the study seeks to identify determinants explaining differences in sustainability performance among O&G companies. The overarching goal is to guide organizations and stakeholders in optimizing sustainability initiatives and understanding regional variations.

The main objective of this study is to investigate the dynamic relationship between sustainability reporting and performance, and examine if there is a significant difference in sustainability performance between O&G companies in the Americas, Asia, Europe, and Oceania, and to examine the determinants of the differences in corporate sustainability performance for the companies across the four regions. Following the motivation for this study, we specifically seek to:

1. Examine if sustainability performance significantly differs by reporting status.
2. Examine the effect of sustainability performance on sustainability reporting; and investigate the moderating effect of audit quality on the relationship
3. Examine the determinants of sustainability performance, and the role of corporate governance, mandatory reporting, and auditor quality in the effect of sustainability reporting on sustainability performance of O&G companies with sustainability reporting status as key predictor.
4. Investigate the explained differences in sustainability performance between O&G companies across regions.

1.3 Research Questions and Hypothesis

In line with the central focus of the study and the outlined research objectives in section 1.2 above, the study provides answers to the following questions and sub-questions:

1. How does sustainability performance significantly differ for reporting and non-reporting companies?

H_o: there's no significant difference in sustainability performance for reporting and non-reporting O&G companies in America, Asia, Europe, and Oceania

H_a: there's a significant difference in sustainability performance for reporting and non-reporting O&G companies in America, Asia, Europe, and Oceania

2.

a. Is the probability of reporting by O&G companies influenced by their sustainability performance?
b. What is the influence of corporate governance, institutional standards, and reporting quality on the likelihood of reporting by O&G companies?
c. What role does the quality of auditors play in moderating the impact of sustainability performance on the effectiveness of sustainability reporting?

3.

a. Does reporting status influence sustainability performance of O&G companies?
b. What is the influence of corporate governance, country regulations on sustainability, institutional standards, and auditor quality on the likelihood of reporting by O&G companies?
c. What is the role of corporate governance on the effect of reporting on sustainability performance?
d. What is the role of mandatory reporting in moderating the effect of reporting on sustainability performance?
e. What is the moderating role of auditor quality on the relationship between sustainability reporting and sustainability performance

4. What are the determinants of the explained differences in sustainability performance between O&G companies across the four regions?

1.4 Originality of Study

This study is the first to conduct a global study on the sustainability reporting and performance of O&G companies. The closest is Okeke (2021) who analyzed 150 reports of 15 O&G companies in America, Asia, and Europe to examine whether the companies are sustainable in their supply chain. Previous studies conducted in the O&G sector and the energy sector in general focuses on sustainability disclosure and reporting (Gaudencio et al., 2020; Nwobu, et al., 2021; Orazalin & Mahmood, 2018), sustainability performance (Aksoy et al., 2020; Artiach et al., 2010; Hummel et al., 2019; Orazalin, 2020; Orazalin et al., 2019; Raucci & Tarquinio, 2020), and its association with financial bottom lines (Orazalin et al., 2019; Shad et al., 2020) without specific account for the regional differences in non-financial performance.

Furthermore, the novelty of the study is also argued from a methodological perspective. The first study to adopt a decomposition by Blinder-Oaxaca to analyze and decompose the differences in sustainability performance of O&G companies and the determining factors into explained and unexplained components of sustainability performance across regions. Frynas &

Stephens (2015) suggests that sustainability practices and concerns are determined by the nature of the industry in question, and that social dimensions differs between industries. That, despite the differences in CSR concerns between regions; industries and organizations share operational features that are common across countries. This cannot be over emphasized for the O&G sectors. They have key operational and strategic concerns that are similar across countries. This shared characteristics particular to the sector's operations include but not limited to the environmental and social impacts of oil spills, local content-related conflicts, and other social impacts on local communities. The sector standards are an important example.

Despite the similarities in oil and gas operations, global reporting standards, and the unanimous concerns for global sustainability, little has been done to harnessing strategic lessons that can be captured from global or inter-regional comparison. Hence, the need to understand the narrative from a regional-level decomposition analysis. To fill this gap, this study adopts a Blinder-Oaxaca approach to decompose the differences in sustainability performance of O&G companies and to analyze the determining factors into explained and unexplained components.

1.5 Significance of the Study

This study is significant for various stakeholders. Firstly, the results of this study will have important implications for the global economy. Industry stakeholders, such as companies, investors, and regulators, would benefit from the study by gaining insights into how O&G companies' sustainability performance varies across different regions. Such insights would help these stakeholders identify best practices and areas for improvement.

Secondly, policymakers and non-governmental organizations (NGOs) concerned with sustainable development would benefit from the study's findings. The study's regional comparison of the determinants of sustainability performance for O&G companies would help these stakeholders develop region-specific policies and programs to improve the industry's sustainability practices and performance. The study has managerial implications. It will help to promote sustainable development by encouraging companies to adopt more sustainable practices. Corporate boards have a significant role to play in promoting sustainability within their organizations, and the results of this study can help to inform their decision-making processes. For example, companies with better sustainability performance are more likely to attract investment and maintain a positive reputation with stakeholders, which can lead to improved profitability in the long run. This can be a learning curve for less-performing, and or non-reporting firm.

Thirdly, society at large would benefit from this study as the industry's sustainability performance has significant implications for the environment, public health, and social welfare. The study findings could help promote responsible business practices and contribute to achieving sustainable development goals.

Finally, the study can help to inform the ongoing debate about mandatory versus voluntary sustainability reporting. Some argue that mandatory reporting is necessary to ensure that

companies are held accountable for their environmental and social impacts, while others argue that voluntary reporting is more effective because it encourages companies to take a proactive approach to sustainability. The results of this study can help to inform this debate by providing insights into the effectiveness of both mandatory and voluntary reporting in promoting sustainability in the sector.

1.6 Scope of the Study

The study focuses solely on the O&G sectors in the Americas, Asia, Europe, and Oceania. The study makes use of panel data of financial and non-financial variables, country-level environmental policy stringency index, mandatory reporting, auditor quality, industry standards such as the GRI guidelines. We also control for firm-level characteristics. The cross-section consists of 161 O&G companies from three industries, 34 countries, and 4 regions, with a time period of 8 years – from 2014 to 2021.

1.7 Outline of the dissertation

This dissertation is divided into nine chapters. Chapter one provides a background to the study, explain the research motivation, and outlines the research objectives and questions, originality and significance, scope, and limitations of the study. Chapter two focuses on both theoretical and empirical literature on sustainability reporting and performance with more attention paid on the O&G sector. Chapter three explains the methodological underpinnings to the study. It includes a description of the study data collection, sample selection, data cleaning, and definition of study variables, the empirical model and method of analysis. Chapter four is dedicated to the descriptive statistics of the data which provide a summary of the data for the global panel and regions. Chapter five, six, seven, and eight presents the results of the study for research questions 1, 2, 3, and 4 respectively. Chapter nine is the conclusion and recommendation section – here, a summary of key findings is provided, and recommendations for future research is provided.

Chapter Two

Literature Review and Hypothesis

2.1 Introduction

This chapter provide a review of pertinent literature on the research objectives, both theoretical and empirical. It touches on topics of corporate social responsibility (CSR), corporate sustainability, and sustainability performance within the O&G sector. The historical background of CSR is extensively reviewed and linked to the concept of sustainability. Multinational organizations such as the O&G companies do not operate in a vacuum. They operate in an environment and within a social context, albeit having varying business objectives which are believed to conventionally revolve around, profit, people, and the planet (economic, social, and environmental components). The production, exploration, and transportation activities of this companies hover around some constituents that are internal and external to the organization, and are essential for corporate existence - survival, growth, and development. It is imperative to review literature on corporate sustainability reporting and performance. In line with this, the theories of corporate sustainability are reviewed.

The focus of the current review is based on the specific objectives of the study – outlined in section 1.4 of chapter 1. The chapter first looks at the corporate of corporate social responsibility and sustainability reporting. Particular attention is accorded to the theories of corporate sustainability, the rationale for corporate sustainability, sustainability reporting and sustainability performance.

2.2 The Concept of Corporate Social Responsibility (CSR)

2.2.1 Corporate Social Responsibility – Different Meaning to Different People

The concept of corporate social responsibility has been differently interpreted, theorized, and practiced by corporations and in different sectors, yet with a basic understanding of doing good to a corporation's contexts. Corporations, institutions, and governments across the world have understand, albeit their varying arguments, that the agenda of social responsibility of corporations to its constituencies vis-à-vis the role of industry players is an important catalyst to driving an all-inclusive growth and global prosperity as envisaged in the 17 Sustainable development goals (SDGs). There are divergent views on the definition of corporate social responsibility as well as the rationale for the practice of corporate sustainability (Bowen et al., 2013; Donaldson & Preston, 1995).

Until recently, the importance of CSR to corporations and its contexts was an area of huge debate – espousing the cost-benefits of CSR practices, its rationale for corporations and its implication in relation to government policy direction – whether CRS should be regulated or left to the discretion of corporations. The concept of CSR has traversed social, economic, environmental, and political issues of micro concerns of firms' operations and its implications on firm performance and the immediate contexts, to national and ultimately to international issues that requires not just a voluntary but proactive action with a global focus.

CSR as a management concept has undoubtedly received general acceptance by all – business practitioners, and management researchers, as an invigorating approach to modern and sustainable business practices (Donaldson & Preston, 1995). Yet, the practice is rather rooted in a scanty understanding, making it a controversial concept in theory and practice (Weber, 2008). The definition by Votaw reflects this controversy; that "CSR means something, but not the same thing, to everybody" (Votaw, 1973, p. 14), understood and interpreted differently as legal responsibility, social legitimacy, charitable contribution, higher standards of behavior, social conscious, responsible for in a "causal mode", social responsible behaviours in an ethical sense among others (López Davis et al., 2017).

Carroll described the scope of the CSR field as poor and further characterized the controversy of the concept as "an eclectic field with loose boundaries, multiple memberships, and different perspectives or training; broadly rather than focused, multidisciplinary, wide breath; brings in a wider range of literature; and interdisciplinary" (Carroll, 1994, p. 14). This explains the differences in focus on CSR practices as explained by (Pfeffer, 2010a). More so, other definitions explicitly linked the concept of CSR to the sustainable development agenda. According to the World Business Council for Sustainable Development (WBCSD), CSR is "the continuous commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as the local community and society at large" (Holme & Watts, 2000, p. 10). The definition by the European Commission as the responsibility of enterprises for their impact on society was quite explicit on the various stakeholders and subtly on how to promote CSR – by integrating social, ethical, environmental, human rights and consumer concerns into corporate operations and business strategies.

Evidently, literature shows no unique or generally agree definition of corporate social responsibility. Generally, the various definitions of CSR make mention of a concept that promotes integration of environmental and social concerns in business operations and attempts to outline how corporations interact or ought to interact with their constituents on a voluntary basis.

2.2.2 The Historical Journey – From the Act of Philanthropy to CSR

The concept of CSR is not new. Although the concept has been conceptually frowned upon and almost relegated as an irrelevant business approach, the idea of CSR has experienced gradual transformation to become widely recognized as one of the orthodox business concepts during the last 40 years or so (Lee, 2008). It was disparaged as a joke, held in strong contention by the business and investment community. It was regarded as an oxymoron and a contradiction in relation to its worthiness of investing in (Lydenberg, 2005) even in the late 1970s when echoes of the idea had reached the business world and registered in some business documents. Eventually, the idea of CSR was promoted by the late 1990s and universally sanctioned by major constituents in society. International organizations such as the World Bank, United Nations (UN), International Labour Organization (ILO) and Organization of Economic

Cooperation and Development (OECD) has not only endorsed the concept of CSR. They documented guidelines and instituted permanent divisions to research, monitor and promote CSR initiatives as the new normal in the increasingly unsustainable business environment (Bolton et al., 2011). Various standards and reporting guidelines have also been implemented and many others continue to evolve overtime (Vintro & Josep, 2010).

Government agencies and business organizations took to the mantra of corporate social responsibility as it became a catchword for responsible and sustainable business. The concept was fervidly embraced amid notable oppositions (Friedman, 1970) and skepticisms about the profitability, social responsibility and sustainability of CSR practices to firms. In the 1990s for instance, nearly 90% of Fortune 500 companies has taken cognizance and incorporated the concept of CSR as a key element in their business targeting (Boli & Hartsuiker, 2001) and actively promoting CSR activities in their annual reports. This is against 1997 statistics where mention of CSR featured in annual reports of less than 50% of Fortune 500 firms (Lee, 2008).

Until the late 1970s, many mid-level managerial ranks within cooperation rejected the strategic notion of CSR implementation. Although mid-level managers in most corporations perceived the CSR adoption and implementation as a costly approach with market outcomes that are highly uncertain, there has been a transformational shift in CSR conceptualization. The concept has gone through arduous process of rationalization – associating it to organizational goals such as stakeholder management and corporate reputation (Lee, 2008). In addition to the cost argument, Friedman (1972) was sure that the concept of CSR and its adoption by corporate managers was unfair to shareholder. That social problems are the responsibility of civil society and politicians while the foremost responsibility of corporate management was to sought the maximization of shareholder value.

Friedman (1962) examined the social role of managers from the principal-agent relationship and concluded that corporate managers, as self-interested homo economicus would make inefficient and unreliable agents in social responsibility, hence, the potential-agency problem in that regards. His behaviourial perception of corporate managers could not permit his analysis of a possible simultaneous and effective pursuit of CSR and tangible corporate outcomes such as corporate financial performance by managers. This new reality of business (Fiorina, 2001) declared by Jeffrey Immelt, CEO of General Electric as “the world has changed’ (Gunther, 2004) occurred rather rapid, albeit the different understanding and interpretation assigned to the CSR concept.

Globally, the starting point for the study of CSR can be linked to Bowen – the father of CSR (Al Nahian, 2021; Tsilikis, 2020). In his seminal book Social Responsibility of the Businessman and as the first modern contribution to the CSR topic, Bowen described the social responsibility of the businessman to refer to desirable actions, decisions and policies undertaken within a business concern and for which are in alignment with the expectations of the society. Bowen’s definition theorizes the corporation-society relationship - that is, CSR as “the obligations of businessmen to pursue those policies, to make those decisions, or to follow those lines of action which are desirable in terms of the objectives and values of our society”

(Bowen, 1953, p. 6). While Bowen's definition forms the blueprint for modern conceptualization of CSR as moral obligation to society (Amponsah-Tawiah & Dartey-Baah, 2012), the shift from social responsibility of business to CRS has since experienced proliferation of diverse terms and application in different fields of study.

2.3 Concept of Corporate Sustainability and Sustainable Development

At a seminal event of September 25, 2015 of the 70th session of the UN General Assembly – one that has revolutionized the world of business, governance and global development and represents a significant paradigm shift – all 193 member states present unanimously adopted the now famous UN 2030 Sustainable Development Agenda, constituting 17 SGDs and 167 sub-goals or targets. The 15-years strategic target of the SDGs succeeded the MGDs which also had a 15-year tenure and produced remarkable results. For instance, the UN MDGs saw a reduction in extreme poverty (Goal 1) – elevating more than a billion people from the poverty trap; increased global access to improved sanitation and drinking water (Goal 7), reduction by half the global under-5 child mortality rate (Goal 4) and saving millions of lives from HIV/Aids, tuberculosis, measles, and malaria (Goal 4 and 6).

(Bergman et al., 2017) identified three distinctive features between the MDGs and SGDs in terms of level of inclusiveness. First, relative to the MDGs that distinguish donor from recipient nations for the global development agenda, the SDGs implicates all nations towards the achievement of the 17 SDGs. Second, governments, private sector and civil society are all required to commit to the SDGs; and third, the need for global partnership both national, international, and between governments and corporations is well instituted as the most distinctive feature of the SDGs.

2.3.1 Sustainable Development

The concept of sustainable development is as old as growth and development concepts in general. In the face of human interaction with nature, the idea of rationalizing resource use and its throughput has never departed from humanity, albeit perceived abstractly or mentioned differently, i.e., what is known as sustainable development today is not different from the ecological development ideas of times past. The increasing natural and environmental problems of today has instigated several and different ideas towards maintaining ecological balance; and sustainable development is proposed approach.

The World Commission on Environment and Development (WCED) defined sustainable development as "development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs" (WCED, 1987: 43). This definition and the general idea of sustainable development was made popular through the Brundtland Report which was published at the end of the 1980s (Ramcilovic-Suominen & Pülzl, 2018). Named after the Norwegian Prime Minister and the Chairman of the Commission at the time, Gro Harlem Brundtland, WCED was convoked in 1983 by the United Nations (UN) to address issues of the increasing deterioration of the natural resources and human environment and its implication for socioeconomic development.

2.3.2 Corporate Sustainability

The term corporate sustainability (CS) has proliferated in definition and construct over the past decades (Carroll & Shabana, 2010). Historically, CS has undergone paradigm shifts (Fifka, 2012) from the idea of social reporting in the 1970s and 1980s to environmental reporting in the 1990s. The terminology subsequently shifted to the idea of CSR and sustainability reporting after the end of the millennium and eventually tied to the development of voluntary standards at firm-levels under the Global Reporting Initiative (GRI) (Kolk, 2010). Aras & Crowther (2008) opined that the adoption of CS has traversed different stages. First, the stage of window-dressing where firms adopt phrases, words, or catch-terms to portray CS without actual changes in practices. Second is the phase of cost containment by implementing business process management techniques focused on cost reduction. In the third phase, business begun to critical concerns for employee and customer satisfaction. This characterized the stakeholder engagement phase. The fourth stage is when firm begun communicating their engagement their initiatives through CSR reports. Fifth is the sustainability phase characterized by intentional and radical approach to business process re-engineering including the adoption of strategic and socially responsible business practices

In its numerous usage in literature, it has been referred to mean the same as corporate social responsibility (Signitzer & Prexl, 2013) and many related terms (see Figure 1). Some draw distinctions between the two terms in the context of its applicability, while many remain confused about the meaning of corporate sustainability. According to (Przychodzen & Przychodzen, 2013), the two terms – CS and CSR – have different theoretical background and historical development. In line with its business focus, CSR has been argued to have its limits to the social and environmental aspects of business activities, thus, defining the boundary of CSR commitment to the sustainable development agenda – socio-environmental aspect.

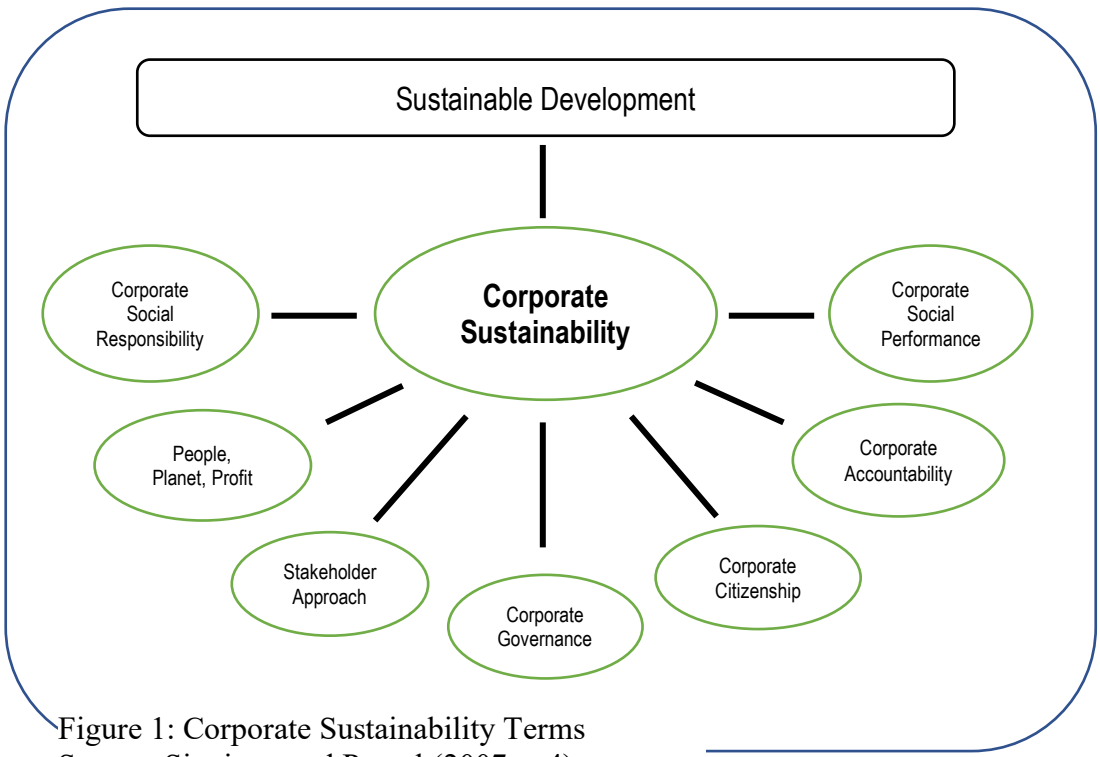


Figure 1: Corporate Sustainability Terms
Source: Signitzer and Prexel (2007, p.4)

Corporate sustainability has been studied by many disciplines, including economics (Aquilani et al., 2018; Epstein et al., 2017), accounting (Braam & Peeters, 2018; Lee & Schaltegger, 2018), management (Epstein et al., 2017; Lee & Schaltegger, 2018), law (Heinämäki, 2009; Hörisch et al., 2017) and marketing (Pedersen et al., 2018; Taoketao et al., 2018). Corporate sustainability is broadly defined as the general transfer and incorporation of the sustainable development idea to and at the firm level (Eweje & Perry, 2011) and the most known broad definition following the definition of sustainable development – as corporations attempt to meet the needs of the present without compromising the ability of future generations to meet their own needs. Other narrow definitions which limited on single dimensions of sustainability. For instance, Pfeffer (2010b) and Goldsmith & Goldsmith (2011) limited their definitions on the environmental dimension –focusing on natural resources utilization and environmental conservation.

There is yet somewhat controversy identified in the studies of (Montiel & Delgado-Ceballos, 2014) as to whether CS should be regarded as a bi-dimensional concept – integrating social and environmental concerns; tri-dimensional – including the economics aspect of business to the social and environment; or likened to environmental management. Like the definition proposed by the study, several research and attempted definitions in literature allude to the three-dimensional focus of CS which encompasses social, economic, and environmental dimensions of corporations' activities towards sustainable development. Often, studies refer to the triple bottom line (TBL), the 3Ps (people, planet, and profit). In this line, an apparent distinction is established in the usage of the terms, CSR and CS (Montiel & Delgado-Ceballos, 2014); referring to CS with the tri-dimensional construct in mind, and CSR when the focus centers on the social aspects of corporate activities or obligations towards society.

2.3.3 Sustainability Reporting

Sustainability reporting is a broad term that describes the disclosures to be made by firms on the positive or/and negative impacts of their activities on the environment, society, and the economy. It is the process through which a firm document and communicate real-world impact of their activities, disclosing commitments to and performance on sustainability – including the economic, environmental, social, and governance dimensions. Hence, this mechanism has the potential to enable firms to set goals, measure performance, and manage change in order to make their operations more sustainable (KPMG, 2013)[2]. Globally, sustainability reporting enables the integration between financial and nonfinancial information, providing stakeholders with enhanced information to make informed decisions.

Recently, there is an increasing trend among many organizations around the world to make their operations sustainable. Furthermore, the idea that long-term profitability should go hand in hand with social justice and environment protection is gaining ground. Hence, the quest to

[2] "Grig4-Part1-Reporting-Principles-and-Standard-Disclosures.Pdf." Accessed September 6, 2021. http://miod.azurewebsites.net/Media/Resource%20Packs/grig4-part1-reporting-principles-and-standard-disclosures.pdf.

move to a truly sustainable economy is understood by organizations' financiers, customers, and other stakeholders. This suggestion is supported by the findings of a recent KPMG's global reporting survey which highlights that more than 50% of reporting companies worldwide include sustainability related information in their annual reports compared to 20% in 2011 (Hassaan, 2016; KPMG, 2013).

2.3.4 Sustainability Report

Sustainability report is a document published by companies to their stakeholder eco-system, mostly voluntarily, eliciting the corporation's sustainability performance over a given period, and with great consideration for the environmental, social, and governance dimensions of its nonfinancial bottom line. These reports are usually prepared and reported annually and forms a greater part of sustainability disclosure of firms and their level of commitment as well as annual contribution to the sustainability agenda – more so, to their constituent of key stakeholders. The content and key focus of sustainability reports differ by sector and among companies within the same sector.

More importantly, sustainability reports are guided by sustainability frameworks or at least follow some standards. The implication is that the sustainability framework adopted by a company determines the contents and nature of its sustainability reports. Although, sustainability practices are informed by multiplicity of factors – organizational objectives (guided by organization's mission and vision) including the rationale advanced by the various sustainability concepts and theories, the preparation of sustainability reports and its reporting structure are guided by sustainability reporting frameworks. According to Amran & Keat (2014), sustainability reports are key avenues for communicating real-world impacts, negative or positive on organizational constituents.

2.3.5 Sustainability Reporting Frameworks

Reporting frameworks are independent instruments, tools or methodologies designed to guide companies in the preparation, implementation, and reporting of sustainability and ESG disclosures. The dynamically changing world of global business requires corporations to make full disclosure of business activities to ensure complete assessment of company prospects by stakeholders. Sustainability reporting frameworks specifically require businesses to disclose qualitative and quantitative information on non-financial components of operations in supplement of the financial information. Sustainability reporting frameworks enable companies, both national and multinational, irrespective of size and age, to assess and disclose their sustainability performance as they do their financial reporting. The use of sustainability reporting framework and the reporting of corporate sustainability profile has practical and long-terms implications for companies. The use of reporting frameworks is very instrumental to the O&G sector where sustainability and CSR related conflicts are common.

Myriad of sustainability reporting frameworks exist worldwide. At least 400 reporting initiatives are recognized in about 64 countries with ideally few standards considered of high

credibility by experts in the area[3]. Sustainability experts contend that the appropriateness of reporting framework is largely influenced by the what and to whom questions of sustainability – that is, what information require communicating and the intended stakeholder target. Various sustainability frameworks and standards have gained international recognition and application by different firms: local, national, international and multinationals. The Global Reporting Initiative (GRI)sustainability Reporting Standards, the Organization for Economic Co-operation and Development (OECD) Guideline for Multinational Enterprises, UN Global Compact (UNGC), Social Accountability (SA8000), International Organization for Standardization (ISO 26000) Guideline on Social, International Integrated Reporting Council (IIRC) International Framework, Dow Jones Sustainability Indices (DJSI), Carbon Disclosure Project (CDP) climate change and water questionnaires, Sustainability Accounting Standards Board (SASB) industry standards, and the Climate Disclosure Standards Board (CDSB) framework are few of the most recognized providers of guidelines for non-financial reporting.

However, the GRI standards for sustainability Reporting is the most adopted sustainability reporting guideline worldwide; one of the comprehensive guides by far (KPMG, 2020). It covers a wide range of sustainability topics, hence, offer companies relevant topics of social, economic, and environmental dimensions to disclose their significant impacts. This makes GRI standards an important framework for sustainability-sensitive sectors such as the O&G that is prone to various sustainability conflicts, and for which they have so much to disclose, especially their environmental performance. GRI standards can be adopted by any organization to report on its sustainability impact in a standardized and comparable way, regardless of size, age, location, sector of operation, whether public or private. This study focuses on the GRI reporting standard given its suitability and applicability to the sector of concern – the O&G sector. More so, GRI has introduced an O&G sector-specific sustainability reporting standard[4].

2.4 Theories of Corporate Sustainability

Social and environmental disclosure promotes the dialogues between an organization and its stakeholders (Tavares & Dias, 2018), and sustainability reports provides a fairly successful means to steering those relationships. However, the theoretical propositions on corporate sustainability practices and corporate performance is varying and still evolving; showing no consensus and superposition of one theory over the other (Belal & Roberts, 2010; Deegan, 2002; Gray et al., 2009). Studies of corporate sustainability have been rooted and founded on different theoretical perspectives.

According to Herbert et al. (2020), the narratives from previous studies are rather inconclusive or conflicting (Jadoon et al., 2021). Deegan (2002) was specific about the variations in the theoretical approaches adopted by previous studies and on the absence of a singular and

[3] Impact Garden. "Impact Garden | Responsible Business - Companies That Benefit Society and Address Negative Impacts." Accessed September 6, 2021. https://impactgarden.org/responsible-business/.

[4] GRI. "The Universal Standards: What's Changing and Why?" *Medium* (blog), August 4, 2020. https://globalreportinginitiative.medium.com/the-universal-standards-whats-changing-and-why-602c8b536599.

common theory for non-financial accounting or corporate sustainability disclosure and reporting while (Tavares & Dias, 2018) argue that sustainability disclosure is a tortuous activity and may not be extensively explained from a single theoretical perspective. Different perspectives are identified in literature including the agency theory, signaling theory, legitimacy theory, institutional theory, resource dependency theory, and the stakeholder theory of corporate sustainability reporting. These theories offer different perspectives on why organizations engage in sustainability reporting and how it can benefit organizations and their stakeholders.

The agency theory emphasizes the principal-agent relationship and how the interest of two groups can be aligned with information disclosure through sustainability reporting. The signaling theory underscore the use of sustainability reporting as a signal of a corporation's commitment to improving positive social and environmental impact and addressing negative impacts on its constituents. The legitimacy theory is of the view that by reporting on its nonfinancial impacts, a corporation establishes and affirms its commitment to the social contract and operational legitimacy. The institutional theory recognizes that organizations operate within a context and are guided by institutional and social arrangements including norms, values, standards, and institutional frameworks. That, through sustainability reporting, a company can show its compliance to the social norms, values and practices, institutional regulations and statutory laws that regulates its operation and binds its existence to its context.

The stakeholder theory purports that the activities of organizations affect and are affected by both internal and external factors and groups. Hence, the sustainability reporting represents organization's acknowledgment and communication of the impact of its operations on its internal and external stakeholders. These different theories, namely agency theory, signally theory, legitimacy theory, institutional, and stakeholder theory, can be used in isolation or together, to convey meaningful information and clarification for corporate behaviors and management practices including sustainability reporting. According to Speziale (2019) and Tavares & Dias (2018), practice of sustainability reporting is better and completely understood, apparently, from the perspective of integrated theory.

Herbert et al. (2020) points that the signaling, legitimacy and stakeholder theories are interrelated viewpoints of the triple bottom line theory. While Ching et al. (2017) adopt the two classification of the economic-based signaling theory and socio-political based theories of stakeholder and corporate legitimacy in examining the sustainability reports in Brazil, Gray et al. (1995) suggest the superiority of the socio-political theories over the pure economic theories in providing intuitive views on corporate sustainability practices. The socio-political theories are interrelated with regards to corporate practices (Deegan, 2002), yet produce conflicting results on the significance and effect of sustainability disclosure or reporting (Fernando & Lawrence, 2014). This study adopts a mix of theories; integrating these theories to explain the importance of corporate sustainability reporting, gain better understanding on the factors of sustainability performance within the O&G sector. The various theories of corporate sustainability are reviewed.

2.4.1 Agency Theory

Inherent principal-agent relationship exists between firm executives and shareholders, even so, major stakeholders as modern approaches purports. While Adam smith (1937) was first to suspect the existence of agency problem in economic transactions between individuals or groups, Ross (1973) and Mitnick (1975) were first to introduced the agency theory in their characterization of the conflict of interest between the agent and principal as the agency problem. The notion of the agency problem is what Friedman (1970, 2007) employed as his foundational argument against the practice of corporate social responsibility - a corporate act he deemed subversive, self-interested and foolish. That, the practice of CSR activities by managers of firms are subversive to acting in the interest of shareholders (principal). Jensen & Meckling (1976) later developed the theory to explore in-depth, the agent-principal relationship through corporate governance.

According to the authors, the governance of a company can be founded on the conflict of interest between owners of companies (shareholders), corporate managers, and major financiers of the corporation vis-à-vis their differing interests and objectives. While corporate directors may have multi-levels of corporate objectives, both financial and non-financial; owners expect the directors to run the corporation in the best interest of the owners – an objective Friedman (1970, 2007) limited to making enough profit; that, the social responsibility of the business is to increase its profits. Similarly, financiers such as lenders have interest in sound management of corporate finances by its managers – the interest of protecting their debt advances to assure that the company can honour its debt commitments. Corporate directors therefore owe fiduciary duty to the company and its owners (shareholders); to act in good faith and as stipulated by the agency theory, put the interest of the principal first.

The agency theory is rooted in the agency problem and the theory is vastly employed in corporate governance literature (Shi et al., 2017; Vitolla, Raimo, & Rubino, 2020). The rationale is that, it is imperative for companies to voluntarily report or disclose more information in order to minimize likely inadvertent agency cost within the agent-principal agreement (Jensen & Meckling, 1976). Grossman (1981) advances in his work on how improvements in reporting practices of companies and voluntary disclosure of firm's operational outcomes and activities including social and environmental elements could help firms to eliminate issues of information asymmetry, moral hazards, and adverse selection. Companies can minimize agency problems by adopting appropriate corporate policies. Corporate governance can be employed to eliminate lack of information about management's performance. Disclosure of corporate activities through sustainability reporting, including information on social and environmental activities has positive implications for agency loss as stakeholders become knowledgeable and mindful of organizational activities.

Proper governance system is one of the major remedies to the agency problem as suggested in literature (Correa-Garcia et al., 2020; García-Sánchez & Martínez-Ferrero, 2018). This include instituting strong information structure that ensures that the principal is informed on agent's action in the performance of their fiducial duties. Other remedies to the agency problem

suggested in theory include managerial ownership, executive compensation, increasing debt level in the firm, blockholders (Panda & Leepsa, 2017), instituting a well composed board of directors that best align within the topical issue of sustainability reporting. According to Vitolla et al. (2020), board of directors are instrumental measures against agency problem and serve as control mechanism in aligning the principal-agent interests through information disclosure – both financial and non-financial information.

From the standpoint of the agency theory, voluntary disclosure of nonfinancial information through sustainability reporting by directors of O&G companies gives full closure to shareholders as to how their funds are being managed and the impact of such investments on society and the environment. Such disclosure reduces lack of information on the part of shareholders. This culminates indirectly into a feasible explanation to the level of corporate returns and the yield on shareholder's investments.

Similarly, it is an important tool for investor's decision making. Until recently, investors did not give much consideration to environmental, social and governance (ESG) dimensions of corporate activities. However, increasing evidence linking top financial performers to corporation that contended well with environmental, social and governance (ESG) and several nonfinancial components of business has instigated investor interest in corporate sustainability. Investors are becoming increasingly interested in non-financial aspects of corporate undertakings and are consistently questioning corporate practices of sustainability reporting (Bernow et al., 2019). Full disclosure of corporate performance, including ESG reports creates the impression of superiority and command over the business operation and promises transparency and efficient management, which generate into positive stakeholder perception of corporate performance, hence, corporate reputation.

Previous studies (Frias-Aceituno et al., 2014; Liao et al., 2015; Vitolla et al., 2020) have adopted the agency theory to link board characteristics to corporate disclosure and sustainability reporting. In the views of Vitolla et al. (2020), the cost associated with the separation of ownership from control within the agency contract can be categorized into three: monitoring, bonding and residual loss. The cost of monitoring possible opportunistic behavior of the agent includes cost of designing incentives to minimize divergence of interests; bonding cost which consist in expenses incurred to prevent the agent form taking decisions that are not in the interest of the principal (this include reward systems), and lastly, the residual loss which derive from not attaining the optimal welfare objectives – all constituting the agency cost which derive from information asymmetry between owner and managers (Barako et al., 2006). Vitolla et al. (2020) and other studies (Healy & Palepu, 2001) contend that information disclosure bridges the information gap between the two parties with consequent reduction in agency cost.

Nonetheless, studies suggest adequate control mechanism in the form of corporate boards in ensuring quality disclosure (Donnelly & Mulcahy, 2008; Vitolla, Raimo, & Rubino, 2020). Board of directors are presumed in literature as key information bridge between managers and shareholders; hence, quality governance serves as catalyst to eliminating information asymmetry within the principal-agency contract. Different studies have examined the effect of

board characteristics (Alfiero et al., 2017; de Villiers et al., 2011; Liao et al., 2015) including board size, board independence, board diversity, and board activity on the quality of corporate information disclosure and sustainability performance using the theoretical foundations of the agency theory. Hence, we expect the positive relationship between board size, board independence, gender diversified board on one hand, and quality sustainability performance.

2.4.2 Signaling Theory

Spence (2002) posit a certain level of information asymmetry between parties as the foundation of signaling theory. Thus, the signaler possesses inside knowledge or information that is not publicly observable to, or has not reached the receiver, at least, with the quality of the signal intended. The signaling theory is widely employed in economic transactions to elucidate corporate behavior in the face of uncertainty and opportunism (Herbert et al., 2020). In this situation, asymmetric information is present – arises when parties to an economic transaction have access to different information. For instance, information concerning the social and environmental aspects of O&G activities may not be accessible or observable to the public, especially regarding how CSR-related conflicts are addressed by firms.

Hence, voluntary disclosure, of a positive or negative information by a signaler is of importance to a receiver (Kirmani & Rao, 2000) especially when the signal is of significant quality (Connelly et al., 2011). According to the theory, a company that voluntarily discloses all hidden information, both pecuniary and non-pecuniary improves trust among its constituents. Intuitively, reporting of significant amount of information could be an indicator of a company's superior position to create positive impression on the market (Healy & Palepu, 2001). In the views of Spence (2002) and Ruhnke & Gabriel (2013), conveying enough information about a company's economic, social and environmental performance to the general public is a catalyst to increased brand value and corporate reputation, and thus has positive implication for financial bottom-line.

Considering the many checkered pasts of O&G companies, responsible and sustainable corporate practices such as sustainability reporting serve to inform the general stakeholders. This has implications for corporations credibility (Kovács & Sharkey, 2014) as well as their reputation and corporate branding – an element Gomulya & Mishina (2017) consider to be largely influenced by the receivers' perception of the quality of the sender. Similarly, Hassaan (2016) contend that bad and good signals influence market reactions as they are considered potential indicators of corporate returns or performance.

The signaling theory has been applied in demonstrating firm quality in several disciplines and literature. In financial economics for instance, firm debt and dividends has been illustrated as signals of firm quality. Connelly et al. (2011) and Riley (2001) argue that different core constructs and concepts of signaling theory emerged from economics and finance literature. Drawing from the intuition of finance and economics, firms, especially those engaged in activities that have high environmental and social consequences have beyond financial reports, key information to illustrate their superior and quality operation. In the modern context of

sustainable business, social and environmental dimensions are of equal importance in mirroring firm image, reputation, and prospects for its network of stakeholders and for the future of their investments, support, and that of the global business world. This makes sustainability reporting and the quality of disclosure (sustainability performance) beyond the economic dimension of business – that is, reporting the social and environmental dimensions of corporate activities is a superior aspect of corporate branding and image. Because stakeholders of today think not only of profits, but also the sustainability of their investments.

The new focus of global business; the dynamic nature of stakeholder interests and recent developments in sustainability disclosure practices and reporting has instigated the use of standalone sustainability reports among the world's big companies (Cho et al., 2011; Michelon et al., 2015). Plethora of studies remarked the significance of the use of standalone reports as instrumental signaling tool (Clarkson et al., 2019; Healy & Palepu, 2001) as suggested by the signaling theory. Other studies (Dhaliwal et al., 2014) contend that standalone reports provide adequate and important information for stakeholder evaluation of the overall quality of sustainability information disclosure by companies. Impliedly, the sustainability report or disclosure, especially the standalone disclosures are a means for firms to communicate their superior commitment and performance to the social and environmental dimensions of their activities aside bottom line (Clarkson et al., 2019; Orazalin & Mahmood, 2018a).

Despite theoretical assumptions that standalone reports provide great deal of voluntary information as empirically justified by Mahoney et al. (2013) for a study of US public companies, the import of the signaling theory is obvious; that is, the influence of voluntary disclosure on stakeholder impression or formed perception of a corporation's image, reputation and promise of sustainable performance in general. Depending on the signals presented in and through voluntary disclosures; whether good or bad, the signaling theory suggests that the market will react accordingly as such signal are perceived as performance indicators (Hassaan, 2016).

Stakeholder demands and expectations are not static, they evolve as the business environment and the global economy experience change. Again, the demands of various stakeholder are not the same, albeit a behaviourial pattern can be identified or modelled on average for key stakeholders. A dynamic firm is expected to adjust to suit the changing demands of its stakeholders, and this is one of the major expectations from firms in the O&G business. In the extraction and production sectors such as O&G operations where social and environmental scandals are common, the use of sustainability reporting does not only communicate corporate performance, but an avenue for firms to justify or explain its social and environmental conducts vis-à-vis outline various measure taken to address such issues. Information disclosure through sustainability reports, either standalone or integrated, serves as a signal of corporate dynamic nature and extent of incorporation of stakeholder demands and expectations. A CSR-conflict prone sector such as O&G can use sustainability reports to signal their superior performance and explain their sustainability related controversies. Hence, we expect a positive relationship between ESG performance and sustainability reporting, and on corporate financial performance and sustainability reporting.

2.4.3 Legitimacy Theory

Companies do not operate in a vacuum, but within a social setting. This include but not limited to the immediate surrounding communities it operates. The legitimacy theory postulates the existence of social contract between companies and society. Similar to the primary financial obligation towards shareholders as suggested by proponents of the conventional business-as-usual model, society to a large extent, have explicit and implicit expectations of companies and business organizations (Waddock, 2001). Societies are governed by some natural rules and moral standards, laws, and provincial arrangements; and any entity operating within the social context are to fall in content with and conform to the various social arrangements.

Society provides the needed natural and human resources, including labour and raw materials for production. In most cases than not, they constitute the immediate external stakeholders, regulatory framework, and the primary market for most companies. Hence, societies have implicit demands and expectations from companies, regarding social protection, employment creation, development, and most importantly, compliance to the moral standards of society. The strive for social legitimacy propel companies to act responsible and within the social bounds. In other words, the legitimacy theory highlights the extent to which nonfinancial disclosures of companies are influenced by established social bounds; as far as companies want to be appreciated and to avoid threat to their legitimacy within the social contract (Hassaan, 2016). The implication is that, companies that adopt socially oriented behaviours gain social approval and license to operate, ceteris paribus (Dube & Maroun, 2017; Lee et al., 2018). Nonetheless, the social contract is rooted on a mutually beneficial exchange (Schiopoiu Burlea & Popa, 2013); society must also have something to offer.

The theory advocates for organizational practices that conforms to and fall within the limits of norms acceptable by the society. According to the theory, voluntary disclosure of corporate social responsibility information is an instrumental approach for companies to project a socially responsible image within the social contract that invokes the social license to operate (Chen & Roberts, 2010). Branco & Rodrigues (2007) argue that the theory help explains the application of any disclosure type employed in bridging legitimacy gap; to defend or repair threatened legitimacy, maintain current levels of legitimacy and to gain or intensify legitimacy. This makes the attainment and maintenance of stakeholder's approval the purpose of legitimation process of organizations (Schiopoiu Burlea & Popa, 2013).

A number of studies (Crossley et al., 2021; Islam et al., 2020; Tilling & Tilt, 2010) have adopted the legitimacy theory to justify social responsibility and sustainability practices of companies including voluntary environmental and social disclosures (Tavares & Dias, 2018) and specifically for the O&G sector (Alciatore & Callaway, 2006; Ismail et al., 2018; Orazalin & Mahmood, 2018b). Mahoney et al. (2013) in their research on social and environmental disclosure practices in emerging economies employed the legitimacy and the stakeholder theories to underscore the fact that to attain the perceived legitimacy, corporate executives must communicate with different and several groups (Huang & Kung, 2010). Legitimacy theory and stakeholder theory are the most widely adopted theoretical perspective in social and

environmental accounting literature; used to explore the motivation behind the triple bottom line reports (Suttipun & Bomlai, 2019; Suttipun & Stanton, 2012)

Unfortunately, the legitimacy is motivated by lack of legitimacy. The negative phenomena of social and environmental concern inter alia the risk of society's reaction conscientize organizations to be critical about legitimacy. The O&G industry have been associated with several social and environmental scandals in the past decades. These scandalous incidences have threatened corporate legitimacy (Fernando & Lawrence, 2014) and caused reputational damage to a number of companies within the sector. This has raised moral concerns regarding business activities within the social context and in many cases, impaired the social contract between companies and its community of stakeholders. A typical example in the O&G sector is the social tensions between Shell Company in the Niger Delta of Nigeria and the local community of Ogoni region. This makes the attainment, repair, or maintenance of, and improvement in corporate legitimacy of the sector paramount. By subscribing to the expectations of society and the local community especially, through sustainability reporting, a company is said to rationalize its corporate practices in support for social and environmental requirements – and this is the thrust of the legitimacy theory.

More so, modern business models require that a company identify with its social context – thus, providing the necessary information beyond annual financial reports; to give assurance of their compliance and support for social standards, and in effect, endorse their willingness to perform their part of the social contract as a moral obligation in return to the implicit social operational license accorded them by society. They do this through social and environmental disclosure. Impliedly, the legitimacy theory of corporate sustainability extends the moral rationale of business activity beyond (Friedman, 2007) short-termism shareholder wealth maximization focus to include social and environmental considerations. To maintain and for that matter justify their social contracts in the face of the many sustainability-related conflicts and scandals, O&G companies are unvaryingly obliged to advance and implement voluntary sustainability report. Legitimacy theory in essence rationalizes such corporate behaviours as instituting and voluntarily reporting its social, economic, and environmental performance in line with the triple bottom line framework. The GRI framework on the O&G industry-specific sustainability disclosure is a perfect guideline for the sector.

3.4.4 Resource Dependency Theory

Resource dependency theory posits that organizations rely on the external environment for resources necessary for their survival and success. In the context of sustainability reporting and performance, organizations recognize the importance of managing their relationship with stakeholders to ensure a stable supply of resources. They engage in sustainability reporting as a strategic activity to demonstrate their commitment to responsible practices and maintain legitimacy in the eyes of stakeholders (Pfeffer & Salancik, 2003).

The theory explains how firms are influenced by external resources. It suggests that organizations rely on their environment for important resources that are necessary for their

survival. The theory emphasizes the need for the firm to establish connections with external resources through networks and relationships (Arora & Petrova, 2010). From a resource dependence perspective, organizations prioritize stakeholders who have control over crucial resources (Jamil et al., 2020). They allocate resources in a manner that satisfies the demands of these stakeholders, as it directly influences their survival and success. By addressing the expectations of stakeholders through sustainability reporting, organizations seek to secure the resources they need for their operations (Pathak & Tewari, 2017).

Furthermore, resource dependency theory suggests that organizations can benefit from sustainability reporting by enhancing their reputation and attractiveness to stakeholders. Reporting on sustainable practices can increase stakeholder trust, improve relationships, and attract environmentally and socially conscious investors, customers, and employees. This increased stakeholder support and resource availability contribute to the organization's overall performance and competitive advantage.

In summary, resource dependency theory provides insights into why organizations engage in sustainability reporting and how it relates to their performance. By managing their relationships with stakeholders and satisfying their resource needs, organizations aim to reduce dependence, enhance legitimacy, and gain competitive advantage. Understanding the dynamics of resource dependence can help organizations including O&G companies to strategically utilize sustainability reporting to secure resources, improve performance, and navigate their external environment (Jamil et al., 2020).

O&G companies and the sector in general have a wide range of stakeholders and external resources to rely on. From internal resources such as the governance body, and external resource like the independent members of the corporate board and external auditors serve as critical resources that the O&G companies can leverage to improve their non-financial position on the market and their sustainability performance in general. Overall, the resource dependency theory emphasizes the firm's reliance on external resources by leveraging their networks, expertise, and qualifications, directors can help the organization access and secure the resources it needs for survival and success.

3.4.5 Institutional Theory

Like the legitimacy theory, organization face institutional pressures because they operate in a society and their actions are guided, regulated, and influenced by institutional stakeholders such as the political, social, and economic systems (Lakhani & Herbert, 2022). This includes government regulations, industry standards, consumer association like the buyers' Unions, employee relations. Institutional theory combines legitimacy and stakeholder theory to understand how organizations recognize and respond to the dynamic social and institutional pressures to maintain legitimacy (Benvebuto et al., 2023). According to this theory, institutions in the environment influence the behavior and expectations of organizations, which are economic entities (Chen & Roberts, 2010). Thus, organizations need to interact with the environment in a way that allows them to acquire legitimacy, resources, and stability, thus

improving their chances of survival. The 'institution' factor is integral to this process, leading to sustainability reporting, which acts as a tool to indicate that the company is operating within acceptable business boundaries (Tavares & Dias, 2018).

According to the institutional theory, organizational choices can be explained through the lenses of the social, political, and economic pressures that organizations are subjected to by institutional stakeholder groups. Lakhani & Herbert (2022) posit that the 'institution' factor plays a crucial role in institutional theory and is characterized by the concept of isomorphism. Isomorphism is defined as the adaptation of an institutional practice by an organization, which leads to greater power and institutional legitimacy, thus promoting the company's stability (Tavares & Dias, 2018). The power exerted by institutional stakeholders could result in coercive, normative, or mimetic isomorphism depending on the degree of influence or restriction it lays on organizational actions or practices (Collin et al., 2009). Coercive isomorphism occurs when various organizations modify their institutional practices due to stakeholder pressure. Thus, when public regulations like mandatory or voluntary reporting are used to induced organizational practices. Sustainability reporting is used to address the economic, social, environmental, and ethical values and concerns of stakeholders who have the greatest power over the company.

Normative isomorphism is related to the pressure of norms to adopt certain institutional practices and meet professional expectations. When organizational activities and practices are shaped by the power exerted by the industry through sector standards and guidelines like the GRI guidelines and other sustainability standards, there is normative isomorphism. In this scenario, sustainability reporting can influence the need to provide information to stakeholders. Finally, Mimetic isomorphism occurs when an organization spontaneously starts imitating other successful organizations in the same sector to face uncertain situations. Sustainability reporting is used in this context as a tool to help companies improve their processes, avoid losing legitimacy, and remain and improve their competitive edge in the business and industry.

According to Tavares & Dias (2018), due to the common isomorphic pressure from similar industries and institutions, organizations in responds to these institutional pressures tend to eventually embrace the same business practices over time, resulting in organizational success and endurance. Practically, isomorphism pressures promote homogeneity within organizational fields, and the global adoption of sustainability practices is a typical case scenario.

2.4.6 Stakeholder Theory

2.4.6.1 Stakeholder Defined

Freeman (2010) defines stakeholder as an individual or group of them, and business entities with vested interest in, or power within a project concern or an activity, and who can influence or be affected by it. For him, any person or persons, organization(s), who perceive itself or themselves to be affected by an activity; those who can affect and be affected by the achievement of a corporation’s purpose are termed stakeholders. This definition by Freeman is arguably the most cited in management literature (Kolke & Pinkse, 2006). It evidently broadens

the scope of stakeholders – which according to Maio (2003), postulate an implicit notion of stake, and unambiguously opens the scope of stakeholders to include virtually everyone.
Clarkson (1995) provided clarity to the definition by distinguishing between the stakeholder types – primary and secondary; also referred to by Metcalfe (1998) as participant and non-participant stakeholders respectively. The primary stakeholders are those who are directly linked to the business operation and without whose continuing participation the corporation suffer the risk of survival and eventual collapse. These include but not limited to internal stakeholders such as customers, employees, manager, investors, and suppliers. Non-participant stakeholders are those who are not essential for the corporation's survival, do not have transactional relationship with the corporation but influence and are influenced, affect and are affected by the corporation (Sweeney & Coughlan, 2008). Theory proposes an effective balance between these two constituent types for improved firm performance. For instance, Reynolds et al. (2006) show positive effect of good balancing of the stakeholder types on financial performance.

Within the O&G sector, the external stakeholder boundary traverses regional and national boundaries. For O&G operations, external stakeholders are defined, to some extent, by the extent of the externalities generating from O&G activities including exploration, production, distribution, and marketing. They include all areas, individuals and groups affected and can be affected by oil spillage, and other environmentally damaging activities from the sector. This study limits the stakeholder category to those within the country of operation. To ensure feasible analysis and be able to draw reference from the study, the stakeholder category of the O&G is limited to internal stakeholders and the immediate environment who are impacted by and can influence O&G operations.

2.4.6.2 The Stakeholder Model of a Firm and Sustainability Reporting
The increasing demand of global economy and the changing nature of business models has facilitated change management and the way organizations perceive its stakeholders. The relationship between an organization and its constituents have transformed from a transactional relationship to a stakeholder relationship, including the system of stakeholder network (Tencati, 2015). The transactional model, also referred to as the conventional input-output model (Figure 2A) has evolved to include a broad spectrum of individuals and groups who affect and can be affected by business activities. In Figure 2, the stakeholders in the input-output model are the investors (shareholders and financiers), customers, employees, and suppliers. This conventional perspective only focuses on the transactional relationship that exists between the organization and key players in the input-output relationship. Investors, suppliers, and employees supply inputs which is transformed in the "black box" into outputs for customers. These contributors expect to receive appropriate compensation for their contributions.

The stakeholder view (Diagram B) on the other hand, show a sharp contrast to the conventional transaction model where the relationship is bi-directional. It looks at the constituents beyond transactional relationship. The system of stakeholder network (Diagram C) under the relational view of the stakeholder relationship depicts a relationship that does not assume the firm to be

the center of focus. Every player in this model is important, including second-tier stakeholders. Hence, the stakeholder of modern and dynamic companies in O&G essentially extends to second-tier relationships. From the O&G outlook, the supplier consists of equipment suppliers, consultation and service providers, vessel owners, and material and consumable providers. Customers include midstream transportation companies and downstream oil marketing and processing companies.

In the modern business-stakeholder network relationship, firms now must respond to a larger constituent with different expectation and stake: direct and indirect. The level of social contract increases with extended firm-stakeholder relation, with alterations in the level and differing support for and claims on the company in terms of power, urgency, and legitimacy. With organizations dealing with a larger audience, the apparent need for information disclosure becomes paramount. For a better understanding of this relationship, it is imperative to better understand stakeholder identification as an important process to effective corporate sustainability (Fritz et al., 2018).

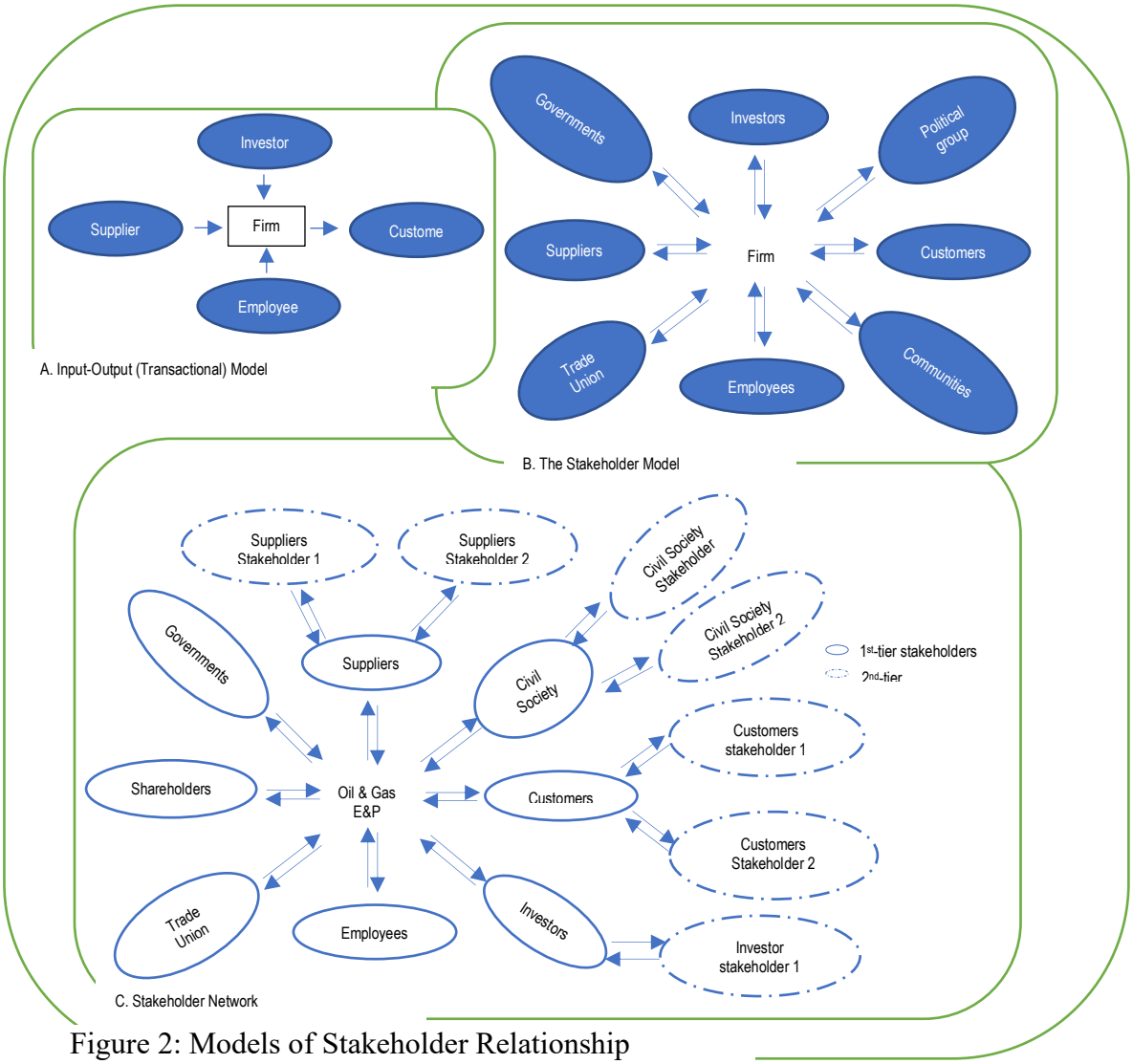


Figure 2: Models of Stakeholder Relationship
Source: Author's Construction from Literature

2.4.6.3 Stakeholder Identification, the 7Ds and Corporate Sustainability

Stakeholders are identified by their attributes. Literature identify three key attributes in the level of stakeholder influence and importance: power, urgency and legitimacy (Benn et al., 2016; Perrault, 2017). Power refers to the probability of a party to a social relationship to impose his will, even in the face of resistance. Urgency is the extent of attention attached to or required by stakeholder claims. Urgency is a perceptual phenomenon that is socially constructed and may vary over time within a spectrum of manager-stakeholder relationship. Legitimacy alludes to a general assumption of the desirability, acceptability, and appropriateness of an individual or group's action in relation to socially constructed system of values, norms, beliefs, and standards.

Stakeholder classification has been founded on these three elements of Power, Urgency and Legitimacy (Harrison et al., 2019; Wood et al., 2021). Different stakeholders will have at least one of these attributes depending on the relationship with the firm or its project. Figure 3 show all 7 stakeholder types (labelled in this study as the 7Ds stakeholder-types) and how their characterized attributes relate with organizational definition of who a stakeholder is. Stakeholders with two attributes (i.e., dominant, dangerous, and dependent) are expectant stakeholders because they expect something of or from the corporation. Highly salient stakeholders are the definitive stakeholder – possesses all three attributes. Less salient stakeholders are those in possessing of only one of the three attributes. They include the dormant, demanding, and dependent stakeholders.

The concept of stakeholder identification is crucial for the O&G companies following the stakeholder theory of voluntary disclosure. The success and quality of sustainability reports is judged by the depth and richness of relevant information disclosed in the reports. Impliedly, it is important to identify relevant stakeholders who are key to the company's existence and survival. This will ensure quality disclosure because, information disclosure will be targeted at addressing pertinent issues to relevant stakeholders who will have high sense of inclusion in the company's decision making. It is therefore of essence for O&G companies to identify their stakeholder relations in line of power, urgency, and legitimate attributes. This help for stakeholder engagement and better streamline of stakeholder-company sustainable relationship.

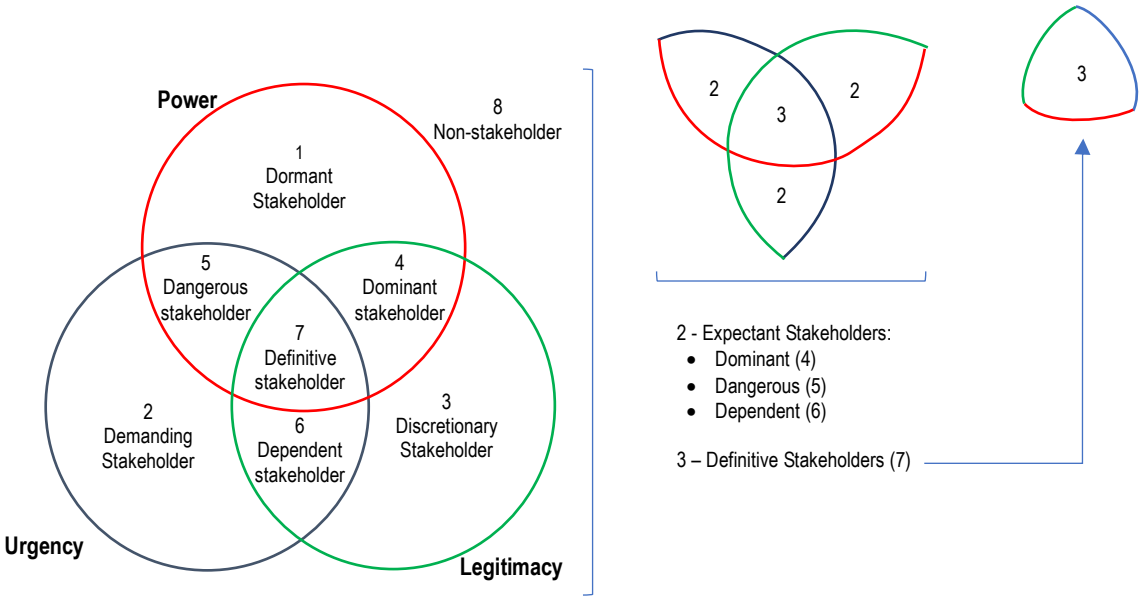


Figure 3: Stakeholder Identification and the 7Ds
Source: Author's Construction from Mitchell, Agle and Wood (1997)

2.4.6.4 Stakeholder Theory as applied in CSR and Corporate Sustainability

The stakeholder theory is argued to have evolved in the management literature in the mid-1960s. The theory is formerly credited to Edward R. Freeman, a business theorist who for more than three decades devoted his scholarly writing to shaping business conception of value. His contribution epitomized a milestone in the widening, development, and reorganization of the responsibilities of the company in the social environment. In the 1986s Freeman formulated the stakeholder theory. According to Freeman (2010), stakeholder theory is a business and managerial theory that conceptualizes the actual function of businesses and how it works. In his noble book, 'Strategic Management: A Stakeholder Approach' first published in 1984, Freeman (1984) provides a reconceptualization of how firms relate to their constituents and establishes a business-constituent relationship that goes beyond the mere concerns for shareholders. The idea of stakeholder relationship with businesses has a focus that looks beyond shareholder's value and the fact that the objective of businesses is to satisfy their shareholders by making lots of profits and declaring enormous dividends (Freeman et al., 2018). More so, the theory debunks the notion of supremacy of shareholder privileges over that of other stakeholders (Smith & Rönnegard, 2016) and recognizes that firms have an obligation and responsibility towards an integrated set of larger constituents (Spence et al., 2001)

Before the stakeholder theory gained prominence, the shareholder value maximization perspective assumed an ideal management proposition at the time and for more than 50 years had dominated business and management thinking (Stout, 2012). According to the shareholder perspective of management, the sole responsibility of management is to make profit and declare highest possible returns to shareholders (Friedman, 1970). This idea is short-sighted, centered on bottom-line profitability and results in short-term organizational thinking at the detriment

of the long-term organizational health of the corporation. The stakeholder perspective on the other hand recognizes the relevance of shareholder and stakeholder value all together, albeit the argument that shareholders are just a part of the key constituents of relevance to successful business operation. Successful businesses operates in a more complex world, and for that matter value creation should focus beyond finance, to satisfying all other key stakeholders (Freeman et al., 2010, 2018).

Freeman et al. (2010) posited that the stakeholder theory is an alternative perspective to understanding the company-people relation in creating value and to transact with each other, especially in world of uncertainty and little stability. The development of the theory is rooted in three interconnected issues. First, the issue of value creation in a turbulent world, second, perspectives to the ethics of capitalism, and third, what to teach in the business schools (Freeman et al., 2018). The theory postulates that the life of most company, if not all, is strongly tied to its ability to satisfy the interest of all those subjects who, influence and are influenced by activities of the company. According to Perrault (2017), the stakeholder approach puts names and faces on the constituents that business must take into account. Imperatively, the stakeholder theory identifies with both individuals and business entities internal to its operations and force of existence such as employees, shareholders, the board of directors, managers, investors; and stakeholders such as financial institutions, customers, suppliers, government, and the local content that are external to the company.

The stakeholder theory reinforces the idea of corporate responsibility to society and make more business sense for sustainability disclosure (Duran & Rodrigo, 2018; Herold, 2018). Despite the innovativeness of the idea of corporate responsibility, the era before the third industrial revolution was not perhaps ready for change. However, the complexities of today's business world and the numerous societal demands for quality environment has forced companies to adjust corporate strategies from shareholder-orientation to stakeholder-oriented position. Corporations have come to understand that devoting corporate resources to CSR is not a mere possibility, but a feasible reality; and does not oppose profit bottom line but complement it. However, the stories for the O&G industry are rather mixed. This assertion makes a case for empirical examination of the corporate sustainability practices and performance relationship for O&G.

The stakeholder theory and legitimacy theory purports complementary and not competitive views of corporate social and environmental disclosure practices, as they both concern mediation, modification, and transformation (Tavares & Dias, 2018). Corporate social disclosures are driven by the need for organizations to legitimize their activities and meet community expectations. Organizations must consider all stakeholders when developing their strategies to avoid losing support and use environmental and social reports to communicate with them. However, corporate sustainability reporting reports may not be as important in some countries where legitimacy is not threatened, or stakeholders are not concerned.

There is a reciprocal relationship between organizations and stakeholders where stakeholders provide resources, and organizations fulfill their needs (Gray & Laughlin, 2012). The

acceptable activities organizations undertake are determined by stakeholders' vision within the community.

The theory highlights various stakeholder groups that may affect an organization, and their influence is crucial for corporate image and comparative advantage. Organizations manage their relationships with stakeholders by providing them with information, often as voluntary disclosure in their annual reports or websites.

Corporate sustainability practices must be based on stakeholders and able to attend to both normative and instrumental aspects to be a basis for competitive advantage. The environmental and social disclosure level is influenced by various stakeholders' groups, such as shareholders and employees, governments, debtors, suppliers, competitors, consumers, organizations of environmental protection, and accounting organizations. It is essential to involve stakeholders in environmental and social accounting to define strategic sustainable aims and coherence in management activities. The focus of the stakeholder is on unexpected environmental and social activities performed by organizations, such as voluntary participation in activities benefiting society or the natural environment, without explicit self-promotion or publicity.

The stakeholder theory sees the world through the management perspective of the organization strategically concerned about continuous success. Activities must be adjusted towards profit, and the stakeholder theory is adequate for research studies concerned with the connection and interaction of organizations or groups (Chen & Roberts, 2010). Environmental and social disclosure integrates the dialog between the organization and stakeholders, and sustainability reports are successful in negotiating those relationships.

2.5 Corporate Disclosure as an Aspect of Corporate Sustainability

Voluntary disclosure of corporate social and environmental activities serves as useful material for evaluating how stakeholder issues are of material importance to a firm (Pizzi et al., 2021). Information disclosure help to understand corporate posture or strategy toward CSR and sustainability. (Ali, 2018) characterized corporate reactions to stakeholder concerns into four: reaction, defense, accommodation and proactive (RDAP). In the same characterization, a company is either fighting all the way, does only what is required, being progressive, or leading the industry.

Sustainability reporting is one important way of defining a corporation’s commitment and strategy towards its stakeholders. When a firm is rated reactive, it means that the firm willingly deny responsibility in which case it is evaluated to be doing less than required. When the firm admits responsibility but fight it, it is said to be defensive and doing the least that is required. Doing all that is required is to be accommodative (accept responsibility); and when a firm does more than is require, it is said to be proactive and anticipate responsibility (Clarkson, 1995). These concepts highlight the importance of the stakeholder theory and its intuitive explanation to the concept of voluntary disclosure. It also reflects how the stakeholder theory relates to various aspects of the agency, signaling and legitimacy theory. Following from the

explanations above, the current study proposes an integrated theory of sustainability disclosure; one that is founded on the stakeholder theory yet integrate the intuitions behind the other theories of corporate sustainability.

2.5.1 Integrated Theory of Sustainability Reporting

Sciulli & Adhariani (2022) are of the opinion that, no single theory is superior or adequate to the investigation on social responsibility and sustainability practices of corporations. In as much as there is various information to communicate to stakeholders and no single information in isolation is self-adequate to stakeholder expectations, social responsibility disclosure serves as instrumental tools for corporations to communicate with stakeholders and assure them of the organization's commitment to stakeholder expectations (Branco & Rodrigues, 2007). These different theories, namely agency theory, signally theory, legitimacy theory and stakeholder theory, can be used in isolation or together, to convey meaningful information and clarification for corporate behaviors and management practices.

Social and environmental disclosure promotes the dialogues between an organization and its stakeholders (Tavares & Dias, 2018), and sustainability reports provides a fairly successful means to steering those relationships. Tavares & Dias (2018) argue that sustainability disclosure is a tortuous activity and may not be extensively explained from a single theoretical perspective. It is better and completely understood, apparently, from the perspective of integrated theory (Speziale, 2019; Tavares & Dias, 2018).

This study develops an integrated stakeholder perspective of sustainability disclosure which explain the various theories within a broader stakeholder lens and concern. Thus, the need to fulfil the social contract hypothesis as postulated by the agency theory can be explicated in a stakeholder context because shareholders fall within the first-class corporate stakeholder tier. Also, sending signals of corporation's adherence to and support for social norms and standards through corporate disclosures are mainly considered instrumental because it is purported to address issues of stakeholder's concern or inform certain relevant audience (stakeholders), be it current or future, influential or powerful stakeholders.

To legitimize one's presence is to gain recognition and acceptance from, and by a group or within a constituent. Hence, a corporation will consider legitimizing its presence and social license to operate only if it considers the social context a non-excludable element in its undertakings. Inevitably, the society, and for that matter, the social context including its human and physical elements are considered powerful and influential force in corporate success. The presupposition is that, the agency theory, signaling theory, legitimacy theory, and the institutional theory can all be conceptualize within a stakeholder framework. Differently put, voluntary disclosure of information for whatever purpose and with whichever motive, has at the apex of its conception, the regard for the corporation's stakeholders. Whether for purpose of fulfilling the social contract, to create positive image, and legitimize the social license to operate; the stakeholder becomes the center of focus – the means and an end.

2.6 Empirical Literature and Hypothesis Development

The O&G sector is highly known for CSR and sustainability related conflicts ranging from pollution including oil spills and emissions through its entire supply chain; from exploration and production to distribution. Various research have been conducted on the factors adopting sustainability reporting with major focus on the likelihood to engage in reporting while others focused on the extent of reporting (Ceulemans et al., 2015). Review of empirical studies on the factors of sustainability reporting can be organized in term of internal and external determinants of sustainability reporting.

The key internal determinants of sustainability reporting identified in most studies include financial and non-financial performance indicators, corporate size, and capital structure. The size of a corporation measured by the total assets, number of employees, volume of sales, or market capitalization has been linked to sustainability reporting.

The research hypothesis is develop based on theoretical knowledge of the theories of corporate sustainability and previous literature. The research hypothesis follows from the study objectives and the research questions outline in section 1.3 in chapter one.

2.6.1 Sustainability Performance and Sustainability Reporting

The signaling theory posit that firms publish their sustainability reports to promote transparency, assure and affirm their superior commitment to the corporate sustainability agenda (Karaman et al., 2021; Mahoney et al., 2013). According to Prado-Lorenzo & Garcia-Sanchez (2010), firm with good sustainability rating would want to report their superior performance to gain competitive advantage while companies with weak ESG rating would refrain from disseminating poor sustainability performance which may harm their strategic reputation.

Empirical literature confirms the two situations in different context and studies, showing inconsistencies in the relationship between sustainability performance and sustainability reporting or disclosure. Mahoney et al. (2013) found positive relationship in a US study, hence, providing support for the signaling theory. Wang et al. (2018) found similar results for the US context while Hummel et al. (2019) confirmed a positive relationship for a study of European companies. Other studies (Cormier & Magnan, 2015; Karaman et al., 2021; Uyar et al., 2020) revealed positive influence of sustainability performance on reporting. Karaman et al. (2021) employed 2277 observation panel data of the energy sector from TR EIKON database and reported positive influence of sustainability performance on sustainability reporting for both high-income and middle-income panel, and the overall panel. Other studies reported negative results to the contrary (Aboagye-Otchere et al., 2020; Guidry & Patten, 2012) while Michelon et al. (2015) and Li et al. (2017) found no association, and a non-linear association respectively. Based on the signaling theory, we hypothesize that:

For composite ESG score,

H_{1A}: Higher ESG performance positively influences sustainability reporting

H_{1B}: Sustainability reporting has a positive influence on ESG performance

For the component scores (EnP, SoP, GvP),

H_{2A}: Higher EnP performance positively influences sustainability reporting
H_{2B}: Sustainability reporting has a positive influence on EnP performance

H_{3A}: Higher SoP performance positively influences sustainability reporting
H_{4B}: Sustainability reporting has a positive influence on SoP performance

H_{4A}: Higher GvP performance positively influences sustainability reporting
H_{4B}: Sustainability reporting has a positive influence on GvP performance

2.6.2 Corporate Governance and Corporate Sustainability

2.6.2.1 Board Committee and Sustainability

Literature (Khan et al., 2021) posit that Board committees are essential strategic oversights – of operational and strategic decisions of the Board of Directors, top executives, and senior managers. Board of directors are elected by shareholder to supervise managerial and executive activities of the company. The board members then form other board committees such as the CSR committee and audit committee with specific strategic mandates. This is to ensure that the organization is achieving set strategic objectives and conforming to best practices.

Forming board committees is essential for organizations to ensure that they are achieving their strategic objectives and adhering to best practices. When board committees oversee specific activities, managers and other internal decision makers become more aware of the relevant issues. This promotes transparency and increases corporate credibility and promotes corporate formation (O'Sullivan et al., 2008), This can lead to better decision-making processes and improve various aspects of governance and organizational performance including sustainability performance (Liu & Zhang, 2017).

Board committees play a crucial role in improving the quality of corporate information. Empirical evidence supports the idea that board committees positively impact corporate information. Amran et al. (2014) found that the presence of CSR committees on the board is associated with better sustainability information in the Asian Pacific region. This highlights the importance of having board committees, particularly CSR committees, in improving the quality of sustainability disclosures. By having such committees, companies can ensure that they address social and environmental issues more effectively and enhance their reputation among stakeholders. This, in turn, can lead to improved organizational performance and long-term value creation. Therefore, having board committees that focus on strategic aspects of the organization can positively influence decision-making processes and ensure that the interests of all stakeholders, including shareholders, employees, and customers, are considered. Following the agency and stakeholder theories and previous studies, we make the following hypothesis:

H_{5A}: The existence of board committee positively influences sustainability reporting
H_{5B}: The existence of board committee positively influences sustainability performance

2.6.3 Corporate Committee Attributes and Sustainability

The existence of corporate governance committees is not enough to promote corporate sustainability. Having effective board of directors is crucial for a company's improved performance and corporate image, and it is a success factor to corporate sustainability practices. Most importantly, previous studies have identified board characteristics that are significant predictors of sustainability performance (Bhatia & Tuli, 2017; Karaman et al., 2021; Orazalin & Baydauletov, 2020; Vitolla, Raimo, Rubino, et al., 2020).

2.6.3.1 Board Size and Sustainability

According to Aksoy et al. (2020), the size of a company influences the size of its board of directors all things being equal. The agency theory posit that a larger corporate board size means greater control of strategic decisions and proper supervision of corporate activities. Increased board size means high chances of diversified talents, expertise, and access to resources. Contrary to this argument, others have also argued that larger board size limits the effective, speedy, and unanimous decisions. (Karaman et al., 2021) in a study of CSR achievement, reporting and assurance in the energy sector with data from the Thomson Reuters EIKON for 72000 firm data from 150 countries globally found a positive relationship for countries form middle income countries but could not find support for an association between board size and sustainability reporting for companies in high income countries for the fixed effects model. Their result for the random effects model found no significant relationship between board size and reporting.

Kassinis & Vafeas (2002) argued that larger board sizes are less effective sustainability conflicts. Their argument was premised on the fact that sustainability reporting is an intensive engagement that require unanimity, coordination and effective communication, which according to the researchers is hard for a larger board to achieve. Kathy Rao et al. (2012) found a positive influence of the size of board measured by the total number of directors, on sustainability reporting. Mahmood & Orazalin (2017) confirmed a positive relationship between board size and sustainability reporting for the oil, gas, and mining sector in Pakistan. Other studies have also reported on board and sustainability performance.

H_{6A}: A positive relationship exist between board size and sustainability reporting

H_{6B}: A positive relationship exists between board size and sustainability performance

2.6.3.2 Board Gender Diversity and Sustainability

Female directors have different values, attitudes, perspectives, communication patterns, and leadership styles than male directors. They care about local communities and stakeholders, and tend to be more sensitive to ethical practices and socially responsive behavior (Orazalin & Mahmood, 2019). They prioritizing stakeholder engagement and ethical practices while being averse to litigation and reputation loss (Isidro & Sobral, 2015). They tend to adopt more trust-building relationships and emphasize intense stakeholder engagement and reduced information asymmetries (Gul et al., 2013). Studies have shown mixed results regarding the relationship between board gender diversity and corporate sustainability reporting. From the stakeholder theory perspective, the presence of female directors is assumed to influence the sustainability

reporting practices of O&G companies. Prior findings on the sustainability effect of gender diversity have been mixed. Bear et al. (2010) in a U.S study of 25 international companies found positive effect of gender diversity on sustainability performance. Buallay & Al-Ajmi (2019), and Liao et al. (2015) confirmed that female on corporate board increases sustainability performance while Khan (2010) and Amran et al. (2014) found no effect of female on a board on sustainability performance. We develop the following hypothesis based on the stakeholder theory, agency theory, and empirical findings:

H_{7A}: female on a board has a positive effect on sustainability reporting.

H_{7B}: female on a board has a positive effect on sustainability performance.

2.6.3.3 Corporate Board Committee Independence and Sustainability

Bashiru et al. (2022) posit that board committee independence signifies higher transparency. The presence of independent directors is key to protecting shareholders' interest (Buallay & Al-Ajmi, 2019). Stakeholder theory suggests that having independent and outside directors on corporate boards improves governance mechanism by advocating for long-term sustainability of companies (Kathy Rao et al., 2012; Mahmood & Orazalin, 2017; Orazalin & Mahmood, 2019). Independent directors do not have ties with shareholders and are not driven by personal financial gains, and are more likely to be sustainability-centered. They prioritize the interest of stakeholders, hence, promote ethical, and sustainability issues.

Empirically, Khan (2010) reported a positive relationship between the number of independent directors and sustainability disclosure and performance in Bangladesh. According to Liu & Zhang (2017) independent directors are source of external knowledge and expertise for strategic corporate decisions. However, Allegrini & Greco (2013) reported that board independence does not affect sustainability performance while other studies (Amran et al., 2014; Liu & Zhang, 2017; Orazalin & Mahmood, 2018) established a negative relationship between independent directors and sustainability outcomes. We conclude by hypothesizing that:

H_{8A}: A positive relationship exists between board independence and sustainability reporting of O&G companies

H_{8B}: Board independence has a positive relationship with the sustainability performance of O&G companies.

2.6.3.4 CEO as board member

CEO on corporate board means that they have some power on the corporate decision making. According to agency theory, CEO power can have negative implication for board decisions and on corporate sustainability performance (Li et al., 2017). This is because excessive power can result in discretional decisions on the part of the CEO to be rent seeking as the expense of sustainability. On the contrary CEOs are embedded with strategic knowledge and expertise that are good for strategic business decisions including corporate sustainability strategies. This assertion is supported by literature (Francoeur et al., 2017; Walls & Berrone, 2017). Muttakin et al. (2018) suggest that CEO power is a factor that can negatively affect the level of CSR disclosure by hindering the board's monitoring ability. Garcia-Sanchez et al. (2020) similarly

found that powerful CEOs are negatively associated with the disclosure of integrated information. Therefore, while board capital, including human and social capital, can enhance CSR practices such as reporting, CEO power may hinder such progress. Moreover, Muttakin et al. (2018) concluded that CEO duality, CEO ownership, and CEO tenure are critical dimensions of CEO power that impact CSR disclosure in Bangladeshi companies. Theoretically, the agency theory supports a positive relationship between CEO duality or CEO on corporate boards and sustainability performance. Therefore, we test the hypothesis:

H_{9A}: CEO on corporate board have significant positive effect on sustainability reporting.

H_{9B}: CEO on corporate board have significant positive effect on sustainability performance.

2.6.4 Country-level Regulatory and Sustainability

2.6.4.1 Environmental policy Stringency

A positive relationship is expected between EPSI and sustainability reporting and performance. Because all things being equal, a company that operates in a country or region that is highly stringent on its environmental policies are expected to be environmentally conscious in their operations, and in many cases would have the moral responsibility to report on its adherence or commitment to the policy. Based on the institutional theory already discussed, we hypothesis that:

H_{10A}: there is a positive relationship between operations in an environmentally stringent country and corporate sustainability reporting for O&G companies.

H_{10B}: there is a positive relationship between operations in an environmentally stringent country and corporate sustainability performance for O&G companies.

2.6.4.2 Mandatory Reporting

Properly designed and enforced mandatory ESG disclosure regulation is expected to lead to improvements in ESG reporting, resulting in more and better ESG reports after such regulation is introduced. However, this may not always be the case due to several factors. Firstly, ESG information is often complex, industry-specific, and covers a wide range of topics, making it difficult to create standardized reporting structures for nonfinancial disclosures (Christensen et al., 2021). Secondly, in many countries, there is a lack of clear guidance on the metrics and information that firms must provide, which may result in some firms adopting minimum disclosure criteria to meet regulatory requirements and disclose low-quality information.

Moreover, the willingness and commitment to enforce mandatory ESG disclosure requirements is likely to vary across countries due to differences in economic development, environmental challenges, or political structures. Weak enforcement could hamper the goal of improving the quality of ESG information. Additionally, some countries have adopted "comply-or-explain" approaches under which firms can choose to explain why they do not disclose ESG information. Therefore, it is unclear whether mandatory ESG disclosure regulation will enhance the availability and quality of ESG information. Typically, Kühn et al. (2014) reported that while sustainability reporting increases with mandatory reporting, the effect of

sustainability performance was minimal. Following the institutional theory of corporate sustainability, we develop the following hypothesis:

H_{11}: There is a positive effect of mandatory disclosure on sustainability performance

2.6.5 Auditor Quality, Sector or Industry-Specific Standards and Sustainability

2.6.5.1 Industry-Level Institutional Factors - GRI guidelines

A company that adopts the GRI guideline is expected to publish its sustainability reports, and endeavour to be a high performer on their sustainability bottom-line. This is a way of signaling their commitment to its stakeholders, and as a form of legitimizing their operation within the sector as far as corporate sustainability is concerned. Sustainability reporting frameworks are intended to reporting companies in the preparations of sustainability reports following best practices.

The adoption of the GRI standards has helped to rationalize the indicators system, reducing duplication, and improving the "logical flow of the Standards" (GRI, 2017). As a result, the GRI is considered the most authoritative and widely recognized reporting framework in the international arena, and it is widely used by a large majority of organizations in many countries (KPMG, 2019). Studies have shown that GRI standards and guidelines are widely used for mandatory NFI reporting in Europe, following the adoption of the EU Directive (Aureli et al., 2019; Muserra et al., 2020). By adopting the GRI guidelines and standards, including the sustainability Performance Indicators (SPIs), companies can better operationalize the requirements of the law, and produce high-quality economic, environmental, and social information in sustainability reports (Gaudencio et al., 2020; Tarquinio et al., 2020). In summary, the GRI standards have helped to streamline the indicators system, and are widely recognized and adopted by organizations around the world (Raucci & Tarquinio, 2020). We hypothesis following the legitimacy theory with a mimetic isomorphism perspective that:

H_{12A}: the use of GRI guideline has a positive relationship with sustainability reporting.

H_{12B}: the use of GRI guideline has a positive relationship with sustainability performance.

2.6.5.2 Auditor Quality / Auditor Type and Sustainability

According to agency theory, the quality of audits can act as a good way to govern and monitor a company's reporting practices and ensure that they make high-quality corporate disclosures, hence, improved sustainability performance (Orazalin & Mahmood, 2018). Large international auditing firms are particular about their integrity and would ensure that their clients portray a good image in the industry and on the market, hence, they would not compromise on quality and substance, they would also ensure sustainability reporting. Moreover, the association between top-tier and big external auditors and sustainability performance can be explained by the resource dependency theory's focus on legitimacy. Sustainability reporting and performance are crucial for organizations to maintain their legitimacy and satisfy societal expectations (Arora & Petrova, 2010). By engaging reputable auditors, organizations enhance their legitimacy in the eyes of stakeholders who view the involvement of these auditors as a signal of the organization's commitment to sustainability. Hence, the resource dependency

theory provides a framework to understand the relationship between top-tier and big external auditors and corporate sustainability performance.

Previous studies (Haniffa & Cooke, 2002) reported a positive relationship between auditing by a large firm and sustainability reporting. Similarly, Orazalin & Mahmood (2018) found positive results for the Russian O&G industry. Also, large auditing firms their integrity to uphold, hence would ensure that their do not only report, also provide advisory services to ensure that their clients are amongst the top performer. Following the agency theory, the stakeholder theory, and the resource dependency theory, we hypothesis that;

H_{13A}: A company audited by a Top-Four firm is more likely to report on its sustainability

H_{13B}: there is a positive relationship between auditing by a Top-Four and sustainability performance.

2.6.6 Interaction Effects

2.6.6.1 Sustainability Performance and Auditor Quality (AuQ) on Sustainability Reporting

The literature suggests that the quality of audits, particularly when conducted by top-tier and big external auditors, plays a crucial role in governing and monitoring corporate reporting practices, leading to improved sustainability performance (Orazalin & Mahmood, 2018). Reputable auditors are seen as a signal of an organization's commitment to sustainability, aligning with resource dependency theory and maintaining legitimacy in the eyes of stakeholders (Arora & Petrova, 2010). Previous studies, including those on the Russian O&G industry, have reported a positive relationship between auditing by large firms and sustainability reporting, emphasizing the importance of auditor integrity (Haniffa & Cooke, 2002; Orazalin & Mahmood, 2018).

Building on agency theory, stakeholder theory, and resource dependency theory, we hypothesize that the quality of audits, especially when conducted by top-tier auditors, significantly positively moderates the relationship between sustainability reporting and sustainability performance. Signaling theory further supports the idea that organizations publish sustainability reports to affirm their commitment to corporate sustainability, gain a competitive advantage, and promote transparency (Karaman et al., 2021; Prado-Lorenzo & Garcia-Sanchez, 2010). Empirical literature presents mixed findings on the relationship between sustainability performance and reporting, suggesting both positive and negative associations. Considering the signaling theory, we propose a hypothesis:

H_{14}: Audit quality (Top4 auditor) significantly positively moderates the influence of ESG on sustainability reporting.

H_{15}: Audit quality (Top4 auditor) significantly positively moderates the influence of EnP on sustainability reporting.

H_{16}: Audit quality (Top4 auditor) significantly positively moderates the influence of SoP on sustainability reporting.

H_{17}: Audit quality (Top4 auditor) significantly positively moderates the influence of GvP on sustainability reporting.

2.6.6.2 Reporting Status and Board Characteristics on Sustainability Performance

The literature highlights the crucial role of effective board committees in strategic oversight and decision-making, emphasizing their impact on corporate transparency, credibility, and governance (Khan et al., 2021; O'Sullivan et al., 2008; Liu & Zhang, 2017). Board committees, particularly CSR committees, are associated with improved sustainability information, emphasizing the positive influence of committee attributes on sustainability disclosures (Amran et al., 2014). Theoretical perspectives, including agency theory and stakeholder theory, support the idea that the existence of board committees positively influences both sustainability reporting and performance.

Building on this, we hypothesize that Audit quality (Top4 auditor) significantly positively moderates the relationship between sustainability reporting and sustainability performance, aligning with the literature's emphasis on the critical role of board committees and board committee characteristics in enhancing organizational sustainability outcomes. Hence, we make the following specific hypothesis:

H_{18}: The number of board committees (COM) have significant positive moderating effect on the sustainability reporting – sustainability performance relationship

H_{19}: The size of corporate boards (Bsz) have significant positive moderating effect on the sustainability reporting – sustainability performance relationship

H_{20}: The proportion of female on corporate boards (BGd) have significant positive moderating effect on the sustainability reporting – sustainability performance relationship

H_{21}: Board independence (BI) have significant positive moderating effect on the sustainability reporting – sustainability performance relationship

H_{22}: CEO duality (CEOBm) have significant moderating effect on the sustainability reporting – sustainability performance relationship

2.6.6.3 Reporting Status and Mandatory Reporting on Sustainability Performance

The study suggests that mandated reporting, when properly designed and enforced, can positively moderate the relationship between sustainability reporting and sustainability performance. Despite challenges such as the complexity of ESG information and variations in regulatory guidance, effective enforcement of mandatory ESG disclosure is anticipated to lead to improvements in ESG reporting quality. While some countries adopt a "comply-or-explain" approach, the hypothesis emphasizes that rigorous enforcement of mandatory reporting regulations enhances the availability and quality of sustainability information. Drawing from signaling theory, firms are likely to publish superior sustainability performance to gain a competitive edge and affirm their commitment to corporate sustainability. Empirical evidence, however, reveals inconsistencies in the relationship between sustainability performance and reporting, underscoring the need for further investigation into the moderating role of mandated reporting. Hence, we hypothesis that;

H_{23}: Mandating sustainability reporting (MandRpt) has a positive significant effect on the relationship between sustainability reporting and sustainability performance.

2.6.6.4 Sustainability Reporting Status and Audit Quality on Sustainability Performance

Building on literature emphasizing the crucial role of audit quality in governing and monitoring reporting practices, especially by reputable auditors (Orazalin & Mahmood, 2018), the hypothesis suggests a positive moderation effect. This aligns with resource dependency theory, as reputable auditors signal an organization's commitment to sustainability (Arora & Petrova, 2010). The positive relationship found in studies on the Russian O&G industry underscores the importance of auditor integrity (Haniffa & Cooke, 2002; Orazalin & Mahmood, 2018). In line with agency theory, stakeholder theory, and resource dependency theory, the hypothesis posits that high-quality audits contribute significantly to enhancing the positive association between sustainability reporting and performance. This aligns with signaling theory, recognizing organizations' publication of sustainability reports for transparency and a competitive edge (Karaman et al., 2021; Prado-Lorenzo & Garcia-Sanchez, 2010). The proposed hypothesis suggests a nuanced understanding, emphasizing the moderating role of audit quality in influencing sustainability outcomes. The study proposes that the interaction between audit quality, particularly when conducted by top-tier auditors, and sustainability reporting significantly influences sustainability performance.

H_{24}: Audit quality (Top4 auditor) significantly positively moderates the sustainability performance (ESG) – sustainability reporting relationship.

2.6.7 Firm Controls and Sustainability

The firm characteristics are used as control variables to examine the consistency of study findings. We examine the effect of these variables on our dependent variables in justification of the theoretical and empirical underpinnings for including them as control variables. The control variables considered in this study are firm size, firm age, leverage and profitability measured by return on equity (ROE). Hence, we do not hypothesis for on variables.

2.6.7.1 Company Size

Company size is an internal factor that has been linked to sustainability practices and performance. The size of a firm reflects the number of its employees or assets. Larger companies have greater exposure to the capital market, they have a wide range of stakeholder demands to fulfil, and have significant resources relative to smaller companies. According to the stakeholder theory and legitimacy theory, larger firms are answerable to a greater stakeholder group due to its high level of visibility, hence, face more pressure to report. They have more reputational concerns due to their greater influence, and are more likely to report in order to prevent greater public scrutiny as purported by the legitimacy theory. Larger companies easily under the eyes of the public and regulators. They attract the attention of all stakeholders (Artiach et al., 2010). They are more prone to environmental and social impacts relative to smaller companies. For instance, the amount of pollution is influenced by the size of production and for that matter the company size.

In addition, larger companies can gain from economies of scale and increase efficiency in sustainability practices than smaller companies, hence expected to perform better due to the

cost efficiency. Empirical studies have reported a positive relationship between firm size and sustainability reporting including Karaman et al. (2021), Ehnert et al. (2016), Kuzey & Uyar (2017), and Lock & Seele (2016).

2.6.7.2 Age

The period a firm has survived in an industry is a good predictor of sustainability reporting and performance, and it can account for the differences in sustainability performance. According to Orazalin & Mahmood, (2018) and Orazalin & Mahmood (2019), older companies are better at sustainability practices and performs better due to their years of reporting experience. Following the legitimacy theory, older companies would have high sense of maintaining their hard-earned reputation. Especially for older O&G companies, they may have existed enough to have their good share of the influence of the society on their operation, hence, would do everything necessary, including information disclosure to maintain their social contract with their context and maintain the status-quo the least, hence we expect older firm to report more on their sustainability impacts, ceteris paribus. Similarly, older firms may have just enough experience and would have adapted to their environment enough to avoid sustainability controversies, hence, improvement in sustainability performance (Mahmood & Orazalin, 2017).

While the justification for reporting is established, the case for the age and sustainability performance is not clear, Hasan et al. (2022) and Bhatia & Tuli (2017) found positive relationship between firm age and sustainability reporting for study of Pakistani companies. On the contrary, Orazalin & Mahmood, (2018) found negative effect for age in a study of the O&G industry in Russia while Mahmood & Orazalin (2017) found no significant relationship. Vitolla et al. (2020) also found negative association between firm age and sustainability reporting. Based on empirical literature and the legitimacy theory, we expect a positive relationship between age and sustainability reporting and performance.

2.6.7.3 Financial Leverage

Higher leverage mean that a company's capital structure consists more of debt than equity. According to Bashiru et al. (2022), debts holders are critical stakeholders who contribute to corporate capital. The agency theory argues that corporate indebtedness has a positive influence on sustainability reporting since the company would want to mitigate agency cost and reduce the cost of capital (Orazalin & Mahmood, 2019). Companies with high levels of debt have a greater need to provide information to lenders, resulting in more disclosures related to sustainability practices. This is because the companies want to reduce the asymmetry of information between themselves and the lenders.

However, some studies have found that companies with low levels of debt invest more in CSR activities because lenders do not exert as much pressure over their activities (Brammer & Pavelin, 2008). Some studies have found that highly indebted companies tend to issue more voluntary disclosures (Aribi et al., 2018). Other studies have not found a significant relationship between leverage and voluntary disclosure. Based on the agency theory, highly

leveraged companies are likely to produce more sustainability-related reporting and performance (Albertini, 2014; de Villiers et al., 2011; Fifka, 2012; Hahn & Kühnen, 2013) to reduce information asymmetry. Bashiru et al. (2022) also found positive relationship between financial leverage and sustainability performance. On the other hand, Hasan et al. (2022) did not find support for a significant relationship between financial leverage and sustainability reporting.

2.6.7.4 Profitability (ROE)

Profitable O&G companies are expected to report of their sustainability. Companies that are profitable are more likely to disclose sustainability information to legitimize their operations. This is supported by previous studies such as Sìmnett et al. (2009), which found that profitable firms tend to disclose more extensive and transparent sustainability information for external assurance. Profitable companies also have a greater incentive to disclose more information to stakeholders to create a positive image and signal their commitment to sustainability practices (Alsaeed, 2006). Other studies, such as Aksu and Kosedag (2006) and Branco et al. (2014), have reported a positive relationship between firm profitability and sustainability disclosures. However, some studies have found a negative or no association between firm profitability and CSR and sustainability disclosures. Based on the signaling theory and previous research, it is expected that profitability will have a positive relationship with sustainability reporting and performance.

2.7 Theoretical Framework

Figure *4* and Figure *5* presents the theoretical frameworks for research questions 2 and 3 respectively. It summarizes the relationship between corporate governance setup, firm internal characteristics, firm profitability, sustainability performance, CSR regulations, and sustainability reporting. It shows the theoretical linkages between predictor variables and the two dependent variables. The hypothesized relationship for the determinants of sustainability reporting is indicated with a subscript letter A, and that for the sustainability performance is indicated with a subscripted letter B. The various arrows show the direction of the relationship proposed for this study and the arrows are labeled with the hypothesis indicated showing which question or set of questions are investigated for each relationship. The linkages are already explained in the previous sections.

The control variable in Figure *5* is added for the purpose of objective 4 where we look at the determinants of the explained differences in sustainability performance. In answering objective 4, the control variables are included as key regressors as the differences in performance could be attributable to differences in firm characteristics.

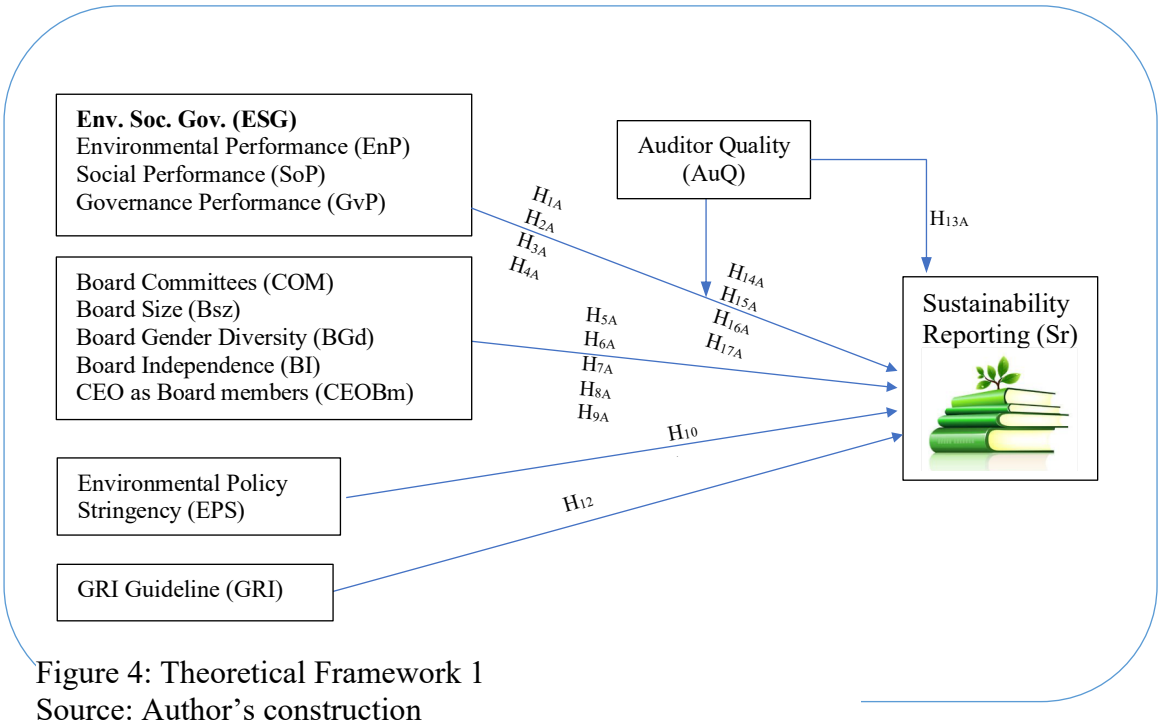


Figure 4: Theoretical Framework 1
Source: Author's construction

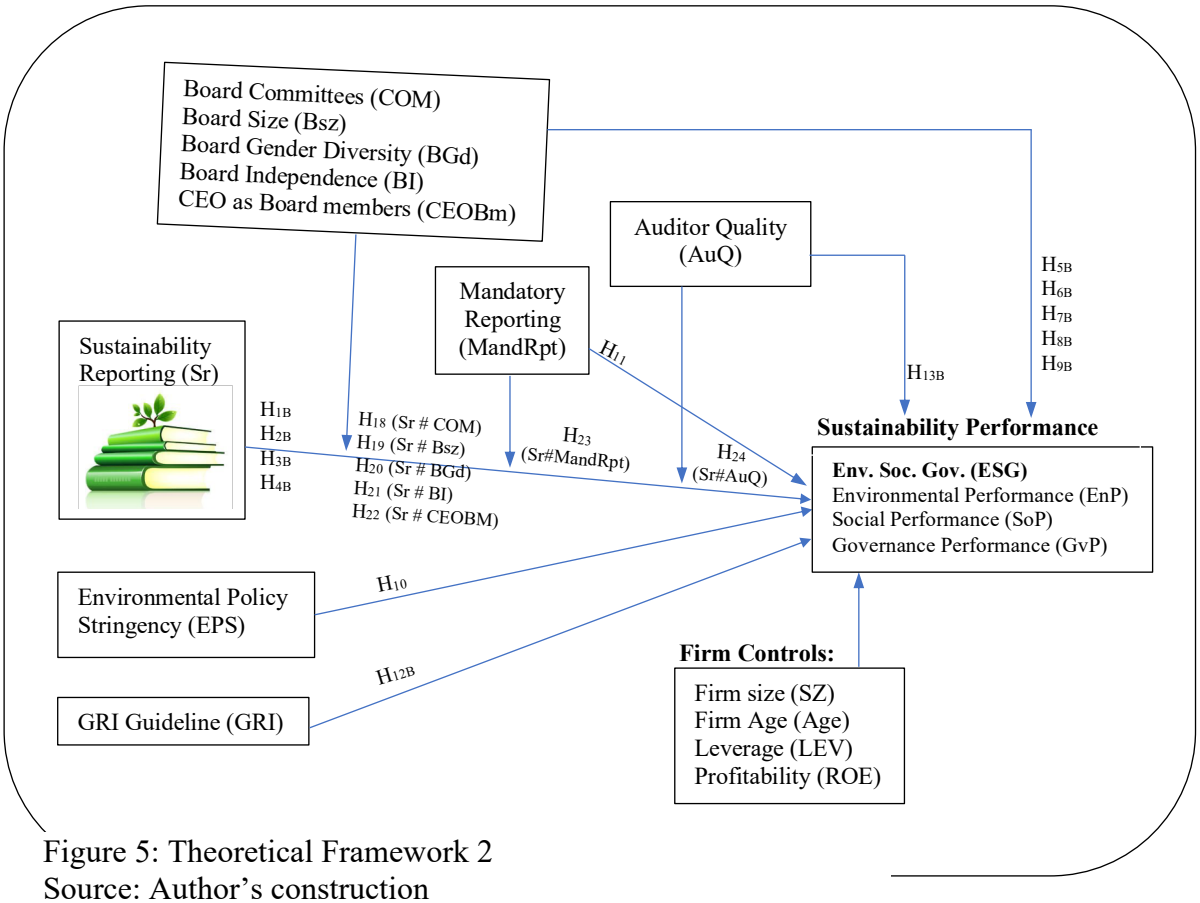


Figure 5: Theoretical Framework 2
Source: Author's construction

Chapter Three
Methodology

3.1 Introduction

This chapter explain the methodological process and approaches adopted for the study. In the sections, the theoretical framework is presented and briefly explained. The research design is explained as well as the method of data collection and preparation for analysis. The focus of this study is to examine the explain determinants of sustainability reporting and sustainability performance and the differences in sustainability performance in the Oil and Gas sector across regions. We first examined if companies differ in performance and other characteristics by reporting status. We employed the independent two-sample test for equality of mean for this purpose. A panel regression model is assumed – a panel probit for the determinants of sustainability reporting since the outcome variable is dichotomous, and a multivariate panel analysis following the intuition of the stepwise regression model. Ultimately, the study examines the differences in sustainability performance between the four regions using the Blinder-Oaxaca decomposition analysis.

3.2 Research Design

This research investigates the intricate relationship between sustainability performance and reporting within the oil and gas (O&G) sector, with a nuanced exploration of the moderating effects of external audit consulting and corporate governance. The study delves into the impact of corporate sustainability performance, governance committee setup, committee attributes, country-level environmental regulations, reporting quality, and institutional standards such as external audit consulting and the utilization of GRI guidelines on sustainability reporting. Employing a quantitative panel research design, the study endeavors to unravel the complexities surrounding these interrelated factors.

The empirical analysis commences with a thorough examination of the reporting status of O&G companies on both global and regional scales. To address the research hypothesis effectively, various methods of analysis are employed, including the strategic recoding of variables to facilitate diverse dimensions of analysis. For instance, the consideration of three levels of auditor quality in understanding a company's likelihood of reporting is streamlined to two levels when examining the determinants of sustainability performance and regional disparities.

Descriptive statistics offer an insightful overview of the dataset, elucidating key trends and patterns. Subsequently, a binary probabilistic regression approach is deployed to scrutinize the likelihood of reporting by O&G companies, considering diverse firm, industry, and country-level predictors. Panel regression analysis follows, probing the intricate relationship from reporting to sustainability performance, with a keen focus on the moderating role of auditing quality and corporate boards. The Blinder-Oaxaca decomposition analysis serves as a powerful tool for dissecting differences in sustainability performance, meticulously disentangling the impacts of various factors across regions.

In their comprehensive review, Velte & Stawinoga (2020) identified ordinary least squares (OLS) and panel regression as frequently utilized methods in empirical research. The quantitative design, particularly the panel approach, aligns seamlessly with the nature of the study data—a panel comprising O&G companies across a diverse cross-section and an extensive time frame of eight years.

Adopting a comparative research design, the study strives to unravel the multifaceted factors contributing to variations in sustainability performance across regions. The Blinder-Oaxaca decomposition analysis, a robust analytical tool, is then applied to dissect observed differences in sustainability performance and reveal the determinants of these variations.

In conclusion, the chosen research design, characterized by its quantitative nature, meticulous analysis methods, and reliance on panel data, ensures a comprehensive exploration of the intricate dynamics surrounding sustainability performance and reporting within the O&G sector. This approach aligns with established methodologies in empirical research and positions the study to provide valuable insights into the multifaceted interplay of factors influencing sustainability outcomes.

3.2.1 Research Approach: Comparative Explanatory Research

The operational activities and performance of oil and companies across different geographies differ in many aspects. At the national level, companies are bounded by different institutions and institutional regulations aside international standards of operations. More so, companies differ in size, structure, and vision. Hence, it is obvious that at the regional levels, companies can differ in observable and unobservable characteristics that could have implications for their outcomes or financial and non-financial bottom-line. Especially for O&G companies, differences in institutional regulations, size, capacity, and scale of operations, operational experience, and governance attributes have implications for their operational outcomes including their social, environmental, and economic impacts. In the context of examining the explained differences in sustainability performance between O&G companies across regions, a comparative research design would be useful in identifying the factors that contribute to the observed differences.

Comparative research design is a type of research that involves comparing two or more entities or groups to identify differences in their behaviours, characteristic, or outcomes. According to (Esser & Vliegenthart, 2017), comparative explanatory design extends beyond comparison of relation questions to address explanations of different relationships across units by taking characteristics of those units into consideration. This is what this study seeks to do in addressing research question four (RQ4). The focus is on explaining the variations in relations across units (Iranifard & Latifnejad Roudsari, 2022). In this study, we use the basic descriptive statistics, the regional regression analysis, and the decomposition analysis by Blinder and Oaxaca.

3.2.1.1 Data Credibility and Comparability

To ensure that our research is valid, it was necessary to make sure that the data we collect can be compared between different groups. This is called equivalence. We did three things to make sure our data is equivalent. First, we made sure that we used the same measurements for all the data we collected. We collected data from different sources for different companies and regions. We used Refinitiv DataStream for firm-level data, and the OECD and Carrot and Sticks databases for country-level data. But we made sure that we collected the data for the same time period and used the same measurements for all the variables. This is called measurement equivalence.

Second, we made sure that we used the same instruments to collect the data. We used the same corporate financial and non-financial reports for all the companies to make sure that the data was consistent. We also used a unique unit of measurement for all the variables across all the companies and regions. For example, we used the United States Dollar ($) for all the financial data. This is called instrument bias.

Finally, we made sure that we used the same criteria for selecting the companies for our study. We only included companies that had reported values for sustainability performance for at least two years between 2014-2021. We also excluded companies headquartered in Africa because they had nearly 100% missing data on sustainability variables. This is called sampling equivalence. By doing these three things, we made sure that our research is valid and that we can compare the data between different groups.

3.2.1.2 Steps in the Comparative Approach

For the comparative study design, we implement three relevant steps. The first step involves identifying the relevant indicators of sustainability performance, which in this case are ESG scores, both composite and component scores. The ESG controversy scores, the ESG combined score, and the ESG pillar scores are also relevant measures of sustainability performance, but for the purposes of this study, only the ESG scores are used. The second step involves comparing the ESG scores of selected O&G companies for two regions at a time.

This step uses statistical analysis, specifically the t-test and a decomposition analysis, to confirm the significance of performance differences in sustainability practices between the two regions. The third step is to examine the factors that account for the identified differences in sustainability performance between the two regions, using multivariate regression analysis supported by regional descriptive analysis and panel regression analysis. A decomposition analysis is employed to show the contribution of each regressor to the differences in regional sustainability performance of the O&G companies. Overall, the comparative research design is useful for identifying the factors that contribute to the observed differences in sustainability performance between O&G companies across different regions.

3.3 Data

The data for this study is a global panel consisting of 161 O&G companies from four regions (Americas, Asia, Europe, and Oceania), thirty countries, and in three industries in the O&G sector for a period of 8 years, 2014 to 2021. The secondary dataset consists of financial, non-financial data, and firm-level control variables for O&G companies, and measures of country-level regulations sourced from online databases. Study variables generally include sustainability reporting and performance indicators, corporate governance structure, auditor characteristics, sustainability characteristics, firm-specific characteristics, and country-level measure of environmental compliance and regulation on sustainability reporting. All firm level data were retrieved from the Refinitiv DataStream database, and the country specific data on environmental policy stringency index (IPSI) was gathered from the OECD database, and data on mandatory reporting was taken from the Carrots and Sticks database[5].

Figure 6 show the companies and country representation in the study data by regions. Out of the total 161 companies, 47.2% are headquartered in America and 9.32% in Oceania. The headquarters of 22% and 21% of the companies are in Europe and Asia respectively. There are a total of 34 countries. The 47.2% of the companies are in 7 (20.59% of the total) American countries. There are 12, 13, and 2 Asian, European, and Oceanian countries represented in the data which are homes to remaining 52.8% of the companies (the list of countries with the number of O&G companies are presented in Table A1). Figure 7 show the industry representation by region. The data captured both the downstream and upstream industries within the O&G sector. The O&G exploration and production dominated with 90 out of the total 161 companies. There are 53 O&G retail and marketing companies and the remaining 18 are O&G integrated companies.

In the carrots and sticks website, there are a total of 392 mandatory and 309 voluntary obligations. This consists of codes, guidelines, and questionnaires (31:102), guidelines and standards for non-financial reporting (20:84), index questionnaires (0:5), other action plan, strategy, programme, voluntary initiative (37:79), public law and regulation (225:23), and self-regulation (36:6) in the order of mandatory and voluntary obligation.

[5] Carrotsandsticks.net

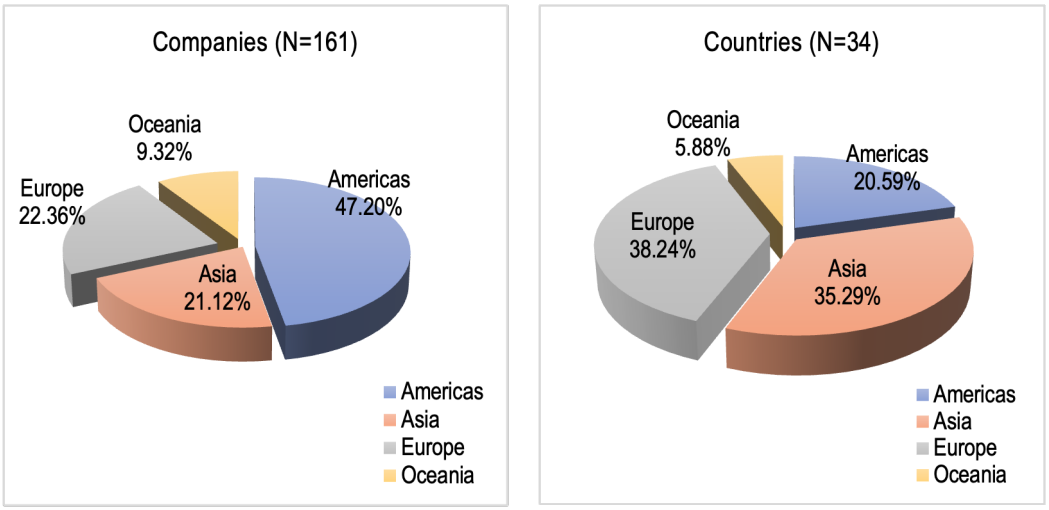
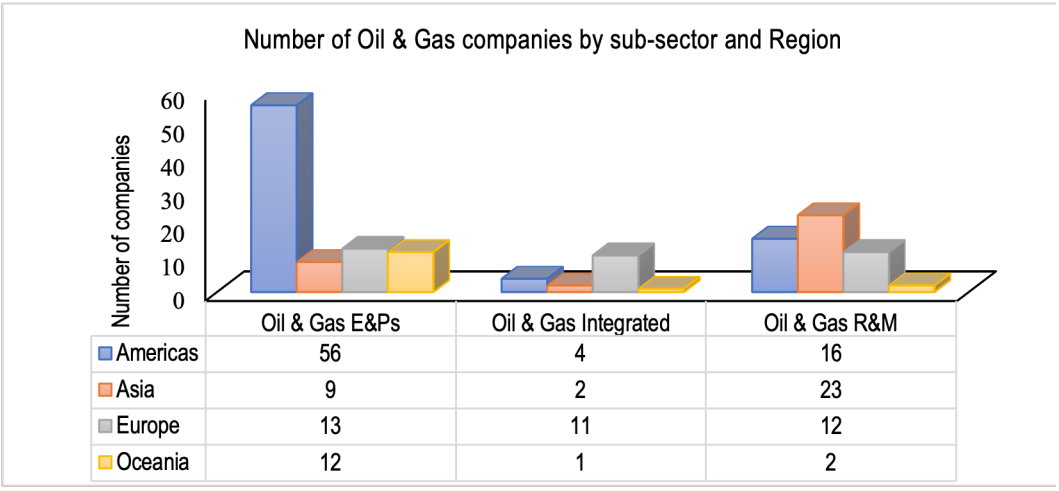


Figure 6: Country and Company representation by regions



	Oil & Gas E&Ps	Oil & Gas Integrated	Oil & Gas R&M
Americas	56	4	16
Asia	9	2	23
Europe	13	11	12
Oceania	12	1	2

Figure 7: Industry representation by region

3.3.1 Sample selection criteria and justification

In panel data analysis, sample selection is important because it has implications for external validity and generalizability of study findings. This process ensures that the sample is a good representation of the population of interest, hence, the avoidance of misleading and biased

results. Appropriate sampling help develop rich and insightful data that is directly linked to the objective of a study (Cash et al., 2021; Palinkas et al., 2015).

The study focused on active, public, and primary O&G companies in the energy sector as shown in Figure 8. The current study is centered around sustainability reporting and performance; hence, it was important that companies have some data on sustainability reporting and performance. The sustainability data in Refinitv database had considerable missing values for many companies. There was therefore the need for a sampling selection that does not bias the study results. Companies were selected based on data availability on the question of whether they publish their sustainability reports.

The time dimension for the study was selected as 2014 to 2021. The year (2014-2021) was purposefully selected. The year 2014 marked the lunch and global adoption of the United Nation's Sustainability Development Goals (SDGs). Beginning with 2014 also assure the availability of sustainability data resulting from the increasing adoption and reporting of sustainability impacts by corporations, and allows for the comparison of sustainability performance across firms and regions.

After gathering the data, a convenient sampling approach was employed and the sample selection took two phases. First, O&G companies that have their headquarters in African countries are entirely excluded. Companies from this region do not have reported data on their sustainability reporting and performance in the Refinitiv dataset, hence, failed to meet the criteria for inclusion. Second, only companies that has values for sustainability reporting for at least two periods (years) were included in the final sample.

The inclusion of only companies with sustainability reporting data for at least two years in this study which compares sustainability across four regions is justifiable on several grounds. Firstly, this criterion enhances data reliability. Having data points over time allows for better trend analysis and reduces the impact of outliers or one-time anomalies. Secondly, it enables comparative analysis between firms within and across regions in terms of trends, patterns in differences in sustainability reporting and performance. It also allows for the accounting of temporal dynamics, such as social, economic, and regulatory changes, and help in capturing longitudinal changes such as sustainability efforts and performance of firms which often evolve gradually. Statistically, this criterion increases statistical power of the data and reduces potential bias that may arise from one-time or sporadic reporting, and minimizes noise in the dataset. This enhances the credibility of the study findings. Moreso, firms with non-response (missing) on sustainability reporting had no data value for ESG scores and its component scores. The implication is that selecting companies with at least two years of data makes it possible to evaluate a meaningful average performance of the firm over the data period relative to using a single-year's performance.

While the two-year criterion ensures a degree of consistency, there is a potential limitation of excluding companies that are fairly new on the market and new to reporting on the non-financial activities and performance. Nonetheless, this limitation is addressed since all the

firms were operationally active before 2014. The minimum and maximum organization year in the data is 1882 and 2010. The youngest firm by age as at the year 2014 was 4 years (2014-2010). More so, including a firm that have no value of sustainability report (missing values for the study period), including firms with only one-year or one-time data on sustainability will weaken the within and between comparability power of our study. The sample selection criterio allows for the meaningful adoption of the mean approach in addressing missing values for continuous variables, as the missingness was majorly on the sustainability reporting and performance data.

A total of 162 O&G companies met the inclusion criteria. However, one (1) company, China Huarong Energy Co.Ltd. was excluded for having an outlier value for leverage, bringing our total cross-sectional sample to 161 companies across four regions, 34 countries and 3 industries as presented in Figure 8. In summary, there are 161 companies forming the cross-section units, and 8 time periods (2014 to 2021) resulting in 1288 (161*8) firm-time observations in total. The data cleaning process explain in detail, how missing values we treated. Both for continuous and categorical variables.

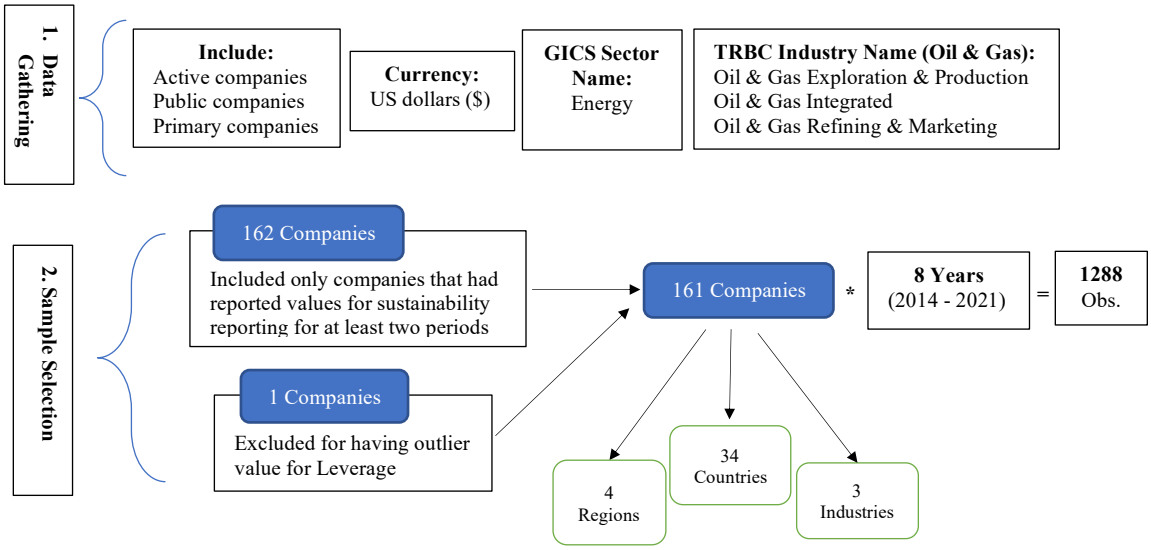


Figure 8: Data Gathering and Sampling

3.3.2 Data cleaning and preparation

Data cleaning and preparation was done in Stata (version 15.1). Analysis of the initial data revealed missing values for some variables. For many of the study variables, the missing data is encountered at the early period of the data. The mean approach was used to replace missing values for continuous and count variables while categorical and binary variables were replaced using the nearest neighbouring values when missing. This method of replacing with mean values is influenced by the nature of the study data. Thus, it further justifies the choice of sampling – selecting firms with at least 2 years of reported data on sustainability performance. In replacing missing values for categorical variables, the time series of the data was initially

reversed by flipping the chronological order of the observation, then forwarding command was executed is Stata to ensure that all missing values are replaced with their forward values.

A variable for firm age was generated to represent the number of years the company has been in active operations. Age of the firm is computed as the current year less the organizations founded year. More of the data cleaning and preparation was done on the study variables which is explained in the next section.

3.4 Study Variables and Definition

The study variables are explained in context with the main objective of the study. The expected effect of the predictor variables on the dependent variables are already discussed under development of hypothesis in the literature review chapter. A summary of the variable definition is presented in Table 1.

3.4.1 Dependent variables (and Independent Variables)

3.4.1.1 CSR Sustainability Reporting (Sr)

In our study methodology, sustainability reporting (Sr) is a key variable used to predict sustainability performance and investigate its determinants across different regions. The SusRpt variable represents whether a company publishes a separate Corporate Social Responsibility (CSR), Health and Safety (H&S), or Sustainability report, or includes a dedicated section in its annual report addressing CSR/H&S/Sustainability aspects.

This binary variable, denoted as 1 if the firm reports and 0 otherwise, serves a dual role in our analysis. Firstly, it acts as a dependent variable when we explore the impact of sustainability performance on sustainability reporting. This examination allows us to understand how a firm's sustainability performance influences its inclination to report on sustainability initiatives. We anticipate that firms demonstrating stronger sustainability performance will be more inclined to disclose their efforts through sustainability reporting, as they seek to communicate their commitment to stakeholders, demonstrate accountability, and portray adherence to societal demands for sustainable practices.

Secondly, the Sr variable operates as a predictor variable in models aimed at understanding the determinants of sustainability performance and identifying performance differences across various regions. Here, we hypothesize that firms engaging in sustainability reporting are more likely to exhibit better sustainability performance. This assumption stems from the belief that companies that proactively report on their sustainability efforts are likely to prioritize and actively manage their environmental, social, and governance (ESG) bottom lines. By disclosing their sustainability initiatives, these firms aim to establish legitimacy, signal their commitment to sustainable operations, and cater to stakeholder expectations.

The Sr variable plays a pivotal role in our methodology, acting as a critical predictor and also being assessed as an outcome, allowing us to comprehensively explore the relationship between sustainability reporting and performance within and across regions.

3.4.1.2 Sustainability performance (SP)

Sustainability performance, assessed through the Environmental, Social, and Governance (ESG) Score, along with its component scores, holds a central position. The ESG Score represents a composite measure of a company's performance across environmental, social, and governance dimensions. It is rank from 0 to 100 indicating low/poor and superior/excellent performance respectively.

As a dependent variable, the ESG Score stands as the focal point of our analysis, serving to understand how various factors, including sustainability reporting, corporate governance, and institutional, industry, and country-specific regulations influence overall sustainability performance. This investigation allows us to ascertain the impact of different predictors on the comprehensive sustainability performance of companies.

Conversely, the ESG Score and its component scores (EnP, SoP and GvP) also function as independent or predictor variables within our models. We use these scores to assess their influence on sustainability reporting and to examine the determinants and disparities in sustainability performance across different regions.

Our hypothesis suggests that firms with higher ESG Scores and stronger performance in individual E, S, and G components are more likely to engage in sustainability reporting practices. This belief stems from the expectation that companies excelling in environmental stewardship, social responsibility, and governance practices are inclined to actively communicate their achievements through sustainability reporting. As such, we expect the ESG Score and its constituent scores to act as predictors of sustainability reporting, reflecting the company's commitment to sustainable practices and accountability to stakeholders.

By leveraging the ESG Score and its component scores as both dependent and independent variables, our methodology allows for a comprehensive exploration of the complex interplay between sustainability performance, reporting practices, organizational attributes, and regional variations. This approach enables us to gain insights into the determinants of sustainability performance while simultaneously examining their impact on sustainability reporting behavior across four regions

The agency and stakeholder theory, the legitimacy theory, the signaling theory and institutional theories purports a positive relationship between sustainability performance and sustainability reporting. In other words, the association between performance and sustainability reporting makes a case for the integrated theory of corporate sustainability.

3.4.2 Independent Variables

3.4.2.1 Corporate Governance Characteristics

3.4.2.1.1 Corporate Board Committees (COM)

It measures whether the company has a corporate governance board committee. This variable assumed the value of 1 if the company has a board committee and 0 otherwise. The agency theory postulates a positive relationship between the existence of committee and sustainability reporting and sustainability performance. In the study, we generate a categorical variable COM indicating the number of corporate board committees that a company has active. We focused on three strategic committees, namely the corporate board committee, sustainability committee, and the audit committee. The highest value for COM is 3 indicating that a company has all three committees. COM assumes the value 0 if a company has no corporate governance committee, 1 if it has only one committee (Only_1), Two_Comm, and All_3 if it has two and three active committee respectively.

Following the agency and the stakeholder theory, this study postulates a positive relationship between the existence of board committee, hence, the number of board committees and sustainability reporting and performance. Companies with more board committees tend to exhibit enhanced sustainability reporting and performance. A higher number of committees often reflects better governance structures, facilitating focused attention on sustainability issues. Increased committees allow for specialized oversight, encouraging a thorough examination of sustainability strategies. This scrutiny encourages transparency, driving better reporting practices. Moreover, diverse committees may enhance decision-making, promoting initiatives that positively impact sustainability performance.

3.4.2.1.2 Board Size (Bsz)

This denotes the total number of members of the board committee of the company at the end of the financial year. It is a continuous variable and assumes any number from 1 if the company has a board committee. Similar to the effect of the number of corporate board committee on sustainability reporting and performance, a larger board size is expected to have positive effect on sustainability reporting and performance. With larger board size, the effect on sustainability performance, hence reporting is varied.

As board size grows, sustainability reporting and performance might show varied impacts. Larger boards might struggle with coordination, affecting reporting clarity. Yet, diverse perspectives in larger boards could enhance sustainability strategies, positively impacting performance. However, overly large boards might face challenges in decision-making efficiency, potentially influencing sustainability outcomes and reporting quality. Balancing board size is key for leveraging diverse expertise while ensuring effective governance for sustainable practices.

3.4.2.1.3 Board Gender Diversity (BGd):

The Board Gender Diversity (BGd) metric captures the representation of women within corporate boards, presenting an outlook on gender inclusivity and an indicator of the significance of female representation in key strategic decision-making roles within a company's governance structure. It represents the proportion of female members within the corporate board, measured as a percentage of the total board composition.

BGd offers insights into the level of gender diversity present at the helm of corporate leadership. A higher percentage of female board members might signify a more diverse and inclusive decision-making environment, potentially contributing to broader perspectives and varied expertise in addressing strategic challenges. Theoretically, we expect a positive relationship between the board gender diversity and sustainability outcomes.

3.4.2.1.4 Board Committee Independence (BI)

This variable represents the proportion of independent members serving on the company's board, reported as a percentage. An independent board member, as defined in this context, is someone not employed by the company and lacking any financial interest in it. These members are chosen by shareholders based solely on their technical expertise in respective areas, devoid of any direct affiliation or financial ties to the company.

In our investigation, we're interested in understanding how the level of board committee independence, as reflected by the BI variable, correlates with sustainability reporting and performance. This metric provides insights into the governance structure's independence and potential influence on sustainability practices within the organization.

A higher percentage of independent board members could signify enhanced governance oversight and reduced conflicts of interest in decision-making, potentially impacting sustainability reporting and performance positively. Their unbiased perspectives might encourage more rigorous oversight of sustainability initiatives, potentially leading to more comprehensive reporting and improved sustainability performance.

3.4.2.1.5 CEO Board Member (CEOBm)

The CEO Board Member (CEOBm) variable indicates whether the Chief Executive Officer (CEO) also holds a position on the company's board. It's a binary measure: coded as 1 if the CEO serves on the board and 0 if not. This variable signifies CEO duality, highlighting whether the CEO simultaneously holds the roles of both CEO and board member. The variable help to explore how CEO duality, as indicated by CEOBm, relates to sustainability reporting and performance. It offers insights into the governance structure's impact on sustainability initiatives within organizations.

CEO duality might showcase stronger alignment between the CEO's strategic vision and board decisions, potentially impacting the company's sustainability practices and reporting. It could indicate more direct involvement of the CEO in shaping sustainability strategies, potentially

influencing the company's sustainability performance positively or, in some cases, affecting reporting objectivity due to reduced board independence. Hence. The relationship between CEO duality on one hand, and sustainability performance and sustainability reporting on the other culd be negative or positive.

3.4.2.2 Country-Level Environmental Regulations

The country level regulation is captured using two distinct variables that are internationally comparable – environmental policy stringency (EPS) and the policy on sustainability reporting (MandRpt). The EPS is expected to measure the country level of environmental policy strictness and the attention for environmental quality at the national or country level. The later measure looks at whether sustainability reporting has been sanctioned in a country, either a general sanction or an industry-specific law or act on sustainability.

3.4.2.2.1 Environmental Policy Stringency (EPS)

In this study, EPS is a dichotomous variable assuming the values 0 or 1 generated from the Environmental Policy Stringency Index (EPSI). EPSI is a country-specific and internationally comparable measure of the strictness on environmental quality and protection computed by OECD. It measures how strict a country is with its environmental policies as EPSI show the degree to which environmental policies put implicit and explicit price on pollution and environmentally harmful behaviours. The index is made up of technology based-policies, market based and non-market-based policies and computed the extent of stringency of 14-environmental policy instruments. The index ranges from 0 to 6 (not stringent to highest degree of stringency). In this study country EPSIs are assigned to all companies headquartered in that country. Also, countries with missing EPSI are assigned the regional mean index, and this index is used for corresponding O&G companies.

From the ESPI, a dichotomous factor variable was generated called the Environmental Policy Stringency (ESP) which assumes the value 0 for weak environmental policy (Weak EP) and 1 for strong environmental policy (Strong EP). In generating the EPS variable, we computed the global mean of the index (mean EPSI = 2.792) which served as the reference value. ESP was recoded 1 (Strong EP) for all EPSI > 2.792, and otherwise 0 (EPSI ≤ 2.792).

3.4.2.2.2 Mandatory Reporting (MandRpt)

This a country-level environmental policy variable that captures whether sustainability reporting is mandatory or voluntary. This data was gathered from the carrotsandsticks[6] database. It is treated as a dummy variable, assigned the value 1 if sustainability reporting is mandated in a country and 0 otherwise.

Mandatory reporting makes it obligatory for companies to disclose their sustainability-related activities and impacts. This increases transparency and accountability, compelling companies to track, measure, and report on their sustainability efforts more rigorously. Likewise, a

[6] https://www.carrotsandsticks.net/

positive relationship is expected between mandatory reporting and sustainability performance, as expected for that between sustainability reporting and sustainability performance.

3.4.2.3 Reporting Quality and institutional Standards

Reporting quality standard is proxied for using the type of external consultation on sustainability by firms. That is, the type of external auditors that audit company's financial and non-financial activities. Also, reporting following the GRI guidelines in this study is a proxy for high institutional standard, hence, quality reporting. These two variables are external factors and institutional standards that promotes quality reporting.

3.4.2.3.1 GRI Reporting Guideline (GRI)

This variable indicates whether a company's CSR report is published in accordance with the GRI guidelines. It focuses on CSR report or data published within the framework or guidelines of GRI principles. GRI variable assumes the value 1 if yes, and 0 otherwise. As part of the data preparation, all missing values for the GRI variable was replaced using forward values following the replacement by neighbouring values. We expect a positive relationship between following the GRI standards in reporting on one hand, and sustainability performance and reporting on the other, all things being equal. Relative to reporting by other auditing firms, if a company is audited by a Big Four or one of the Top 4 audit consulting companies, it is assumed to follow quality reporting procedures, guidelines, and standards. Likewise, a company that adopts the GRI guidelines in its reporting is said to follow institutional standards that adheres to quality reporting principles and procedures, all things being equal.

3.4.2.3.2 Auditor Quality (AuQ)

Auditor Quality is a dummy or categorical variable generated from data on CSR external auditor type/name, also categorical. CSR external auditor name is a spring variable and it contains the name of the external auditor. In this study, we convert external auditor type into a dummy or categorical variable assuming the value 1 for firms audited by Top or Big Four auditing companies (labelled Top_4), and 0 otherwise, labelled Non_Top_4. This categorization distinguishes between audiing consultation provided by top four coded 1, and other auditors (including missing values and firm that do not consult the services of external auditors) coded 0. Similar to the treatment of all categorical variables, replacement by neighbouring variable was used to replace all missing values for AuQ.

Top Four auditors according to this study are Deloitte and Touche, Ernst and Young, KPMG, and Pricewaterhouse Coopers (PwC). Top_4 auditors are well-known for the high earned reputation in the auditing sector and it is expected that they would want to maintain their quality performance and reputation by signaling their corporate integrity and transparent operation. Hence, they are expected to promote sustainability reporting and performance of their clients.

3.4.3 Firm control variables

3.4.3.1 Firm size, Firm Age, Leverage, and Profitability (ROE)

Firm controls are introduced as a measure of testing the consistency of the model predictors and also observe the implications of firm characteristics on sustainability reporting and performance. Four controls are introduced in this study – firm size, firm age, leverage, and profitability measured by return on equity (ROE). Firm size measures how big a company is in terms of its asset. Firm size is measured by the log of total assets of the firm. We control for firm age in this study. It measures how long a firm has been in operation, and in the industry since its commencement of operation. It is measured as current years less the organization founded year.

The financial leverage was used as a measure of firm leverage. It is calculated as the ratio of total debt to total equity at the end of the year. It is expressed as a percentage. It is an indication of the company's capital structure – the proportion of debt a company has relative to its shareholder's assets.

Return on equity is a measure of firm profitability and it is calculated as the net income before extraordinary items for the fiscal year divided by the same period's average total equity and is expressed as a percentage. Average total equity is the average of total equity at the beginning and end of the year. Companies that are financially capable are expected to be able to undertake the financial cost associated with corporate sustainability agenda, specifically, on sustainability reporting.

Table 1:Variable Descriptions and Expected Signs

Variables	Denotations	Operationalization	Panel Probit	Panel Regression & Oaxaca Model
Dependent Variables:				
Sustainability Reporting		1 if firm publish sustainability report, 0 otherwise	Sr	
Sustainability Performance		scored 0 to 100		ESG, EnP, SoP, GvP
Independent Variables:				
1. Sustainability Reporting	Sr	1 if firm publish sustainability report, 0 otherwise	Na	+
2. Sustainability Performance (SP):				
ESG score	ESG	scored 0 to 100	+	Na
Environmental pillar score	EnP	scored 0 to 100	+	Na
Social pillar score	SoP	scored 0 to 100	+	Na
Governance pillar score	GvP	scored 0 to 100	+	Na
3. Corporate Governance Committee & Board Characteristics:				
Number of corporate committees	COM	0 to 3 (0=None, 1=Only one, 2=Two_Comm, & 3=All_3)	+	+
Board size	Bsz	total number of board members	+	+
Board gender diversity	BGd	proportion of women on the board committee	+	+
Board independence	BI	proportion of independent members on the board		
CEO duality	CEOBm	1 if CEO is on the corporate board, otherwise 0	±	±
4. Reporting Quality & Institutional Standards:				
GRI guidelines	GRI	1 if company uses the GRI guideline in reporting, otherwise 0	+	+
Auditor type/quality	AuQ	1 if company is audited by a TOP/BIG 4, 0 otherwise	+	+
5. Country-Level Control:				
Environmental policy stringency	EPS	Scale measure (1=low to 6=high)	+	+
Mandatory reporting	MandRpt	1 if sustainability reporting is mandatory, otherwise 0	Na	+
Firm-specific controls:				
Firm Size	SZ	the number of years since the establishment of an entity		
Firm Age	Age	the natural log of total asset of the company		
Profitability	ROE	Net profit to total asset ratio		
Leverage	LEV	Debt divided by total assets		

In the probit model, the uncategorized EPS is used.
Na = not applicable

3.5 Models and Methods of Analysis

3.5.1 RQ1: Method of Analysis

3.5.1.1 Cross-tabulations and Test of Means

Sustainability reporting is an important step toward corporate sustainability and the readiness of corporations to show commitment to the global sustainability agenda. To gain a better understanding of the determinants of sustainability reporting, it is important to distinguish reporting and non-reporting companies in relation to their ESG performance, corporate governance statistics, reporting quality and instructional standards, firm characteristics, and country level environmental regulations. This analysis goes beyond the global and regional descriptive statistics presented in the next chapter. It included cross-tabulations of sustainability performance, corporate governance committee setup and attributes, adoption of GRI guidelines, external auditors, firms-level controls, and country level environmental regulations, by sustainability reporting status and region.

This method of panel analysis compares the regional statistics of the companies that publish their sustainability report against the companies that do not report. This is done for all the regions separately and compared with the global average. With this analysis, we compare study variables including sustainability reporting score for all the regions by reporting status.

To test the hypothesis of whether sustainability reporting significantly differ for reporting and non-reporting companies, we conduct this analysis separate for each region. We employ the independent-two-sample test for difference of means. The independent-two-sample T-test is employed because our analysis sought to find out the differences in the mean performance of two groups belonging to the same population – the mean difference in the sustainability performance of two groups - reporters and non-reporters of sustainability impacts within the same region. This analysis is conducted under the respective null and alternate following hypothesis:

$$H_0: \overline{SP}_R{}^k = \overline{SP}_{UR}{}^k = 0$$
$$H_a: \overline{SP}_R{}^k \neq \overline{SP}_{UR}{}^k \neq 0$$

where $\overline{SP}_R{}^k$ is the average sustainability performance ($\overline{SP}$) for all O&G companies in region k that report (R) on their sustainability outcomes, and $\overline{SP}_{UR}{}^k$ the average sustainability performance ($\overline{SP}$) for all O&G companies in region k that do not report (UR) on the sustainability.

We will fail to reject the null hypothesis if our test statistics fall outside the 95% critical bound.

3.5.2 RQ2: Empirical Model and Method of Analysis

3.5.2.1 Model Specification

The focus of this section is to analyze the factors that influence a company's decision to publish sustainability report using panel data. To assess the effect of corporate governance, sustainability performance, and country-level regulation, and reporting quality and external factors on sustainability reporting by O&G firms, we specify a multiple regression model of the functional form in equation (1).

$$y_{it} = F(X'_{it}\beta) \tag{1}$$

Where y_{it} is the sustainability report of company i at period t which is represented by Sr_{it}, X'_{it} is a vector of predictor variables (regressors), and β represent a conformable parameter vector. We estimate the econometric models in equation (2) and (3) by adopting a step-wise approach which expresses the relationship between sustainability reporting and the predictor variables below. The key predictors are the sustainability performance scores.

We estimate 10 different models (M1-M10) using equations (2) to (5). Equation (2) involves estimating step-wise models (M1 to M3) with each ESG component (EnP, SoP and GvP respectively) separately, and M4 with all the component scores only (without controls). Models M5 and M6 encompassing only the composite score (ESG) and auditor quality (AuQ) respectively as the only predictors of Sr without consideration for firm characteristics. M5 is estimated with equation (3) while M7 can be estimated by equations (2) or (3).

Equations (2) and (3) are the full models for the relationship between sustainability performance and sustainability reporting without interaction (full model without the interaction term). They respectively form the basis for estimating model 7 and model 8. Equations (4) and (5) include interactions (full model with interaction) and are the econometric models for M9 and M10.

$$\begin{aligned} Sr_{it} = \beta_0 + \beta_1 EnP_{it} + \beta_2 SoP_{it} + \beta_3 GvP_{it} + \beta_4 COM_{it} + \beta_5 Bsz_{it} + \beta_6 BGd_{it} \\ + \beta_7 BI_{it} + \beta_8 CEOBm_{it} + \beta_9 EPS_{it} + \beta_{10} GRI_{it} + \beta_{11} AuQ_{it} + Z_{it} \\ + \epsilon_{it} \end{aligned} \tag{2}$$

$$\begin{aligned} Sr_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 COM_{it} + \beta_3 Bsz_{it} + \beta_4 BGd_{it} + \beta_5 BI_{it} + \beta_6 CEOBm_{it} \\ + \beta_7 EPS_{it} + \beta_8 GRI_{it} + \beta_9 AuQ_{it} + \epsilon_{it} \end{aligned} \tag{3}$$

where the variables are as already defined in Table 1. The variables Z_{it} in the model represents controls. This includes the firm controls as already defined, regional controls, and time dummies; applicable in the models where necessary.

To examine the moderating effects auditor quality (AuQ) on the nexus between sustainability performance and sustainability reporting, we interact the sustainability performance indicator variables and auditor quality in equations (2) and (3). Thus, we include the interactions [(EnP

SoP GvP) * AuQ)] and (ESG * AuQ) in (2) and (3), and formulate equations (4) and (5) respectively.

$$\begin{aligned} Sr_{it} = {} & \beta_0 + \beta_1 EnP_{it} + \beta_2 SoP_{it} + \beta_3 GvP_{it} + \beta_4 AuQ_{it} \\ & + [(\beta_5 EnP_{it} + \beta_6 SoP_{it} + \beta_7 GvP_{it}) * AuQ_{it}] + \beta_8 COM_{it} + \beta_9 Bsz_{it} \\ & + \beta_{10} BGd_{it} + \beta_{11} BI_{it} + \beta_{12} CEOBm_{it} + \beta_{13} EPS_{it} + \beta_{14} GRI_{it} + Z_{it} \\ & + \epsilon_{it} \end{aligned} \tag{4}$$

$$\begin{aligned} Sr_{it} = {} & \beta_0 + \beta_1 ESG_{it} + \beta_2 AuQ_{it} + \beta_3 [ESG_{it} * AuQ_{it}] + \beta_4 COM_{it} + \beta_5 Bsz_{it} \\ & + \beta_6 BGd_{it} + \beta_7 BI_{it} + \beta_8 CEOBm_{it} + \beta_9 EPS_{it} + \beta_{10} GRI_{it} + \epsilon_{it} \end{aligned} \tag{5}$$

Where Sr_{it} is as already defined, as well as the other variables, and ϵ_{it} is the idiosyncratic error term for company i at year t, and it is assumed to be independently and identically distributed across companies and over time, with a constant variance and zero (0) mean.

Equation (4) can be alternatively written as in (6) below;

$$\begin{aligned} Sr_{it} = {} & \beta_0 + \beta_1 EnP_{it} + \beta_2 SoP_{it} + \beta_3 GvP_{it} + \beta_4 AuQ_{it} + \beta_5 (EnP_{it} * AuQ_{it}) \\ & + \beta_6 (SoP_{it} * AuQ_{it}) + \beta_7 (GvP_{it} * AuQ_{it}) + \beta_8 COM_{it} + \beta_9 Bsz_{it} \\ & + \beta_{10} BGd_{it} + \beta_{11} BI_{it} + \beta_{12} CEOBm_{it} + \beta_{13} EPS_{it} + \beta_{14} GRI_{it} + Z_{it} \\ & + \epsilon_{it} \end{aligned} \tag{6}$$

3.5.2.2 Method of Analysis: Panel Probit

The panel data analysis model is used to estimate the coefficients of the models specified in equations (2) to (5) above, and to determine which factors influence sustainability reporting. Specifically, the study makes use of the panel probit estimation technique with the 'vce robust' option to correct for differences across O&G companies. The dependent variable of the specified model assumes the value of 1 if the company reports on its non-financial impacts, and zero (0) otherwise such that;

$$SusRpt_{it} = \begin{cases} 1 & if\ company\ reports \\ 0 & otherwise \end{cases}$$

We use the standard random effects probit specification which shows the probability of a company reporting on its sustainability impacts given the predictor variables of the form:

$$P_i = pr(SusRpt_{it} = 1 | X_{it}) = \phi(X'_{it}\beta) = \int_{-\infty}^{X'_{it}\beta} \phi(z) dz \tag{7}$$

Where pr denotes probability

Sr_{it}, X'_{it}, and β are as already defined

ϕ is the cumulative distribution function of a standard normal distribution such that the predicted probability is limited between 0 and 1. Thus, $0 \leq p_i \leq 1$.

In this study, the model coefficients are estimated using the Maximum Likelihood function for a panel probit model of the form:

$$LL(\theta) = \sum_{i=1}^{N}\sum_{t=1}^{T}[y_{it}\ln\phi(X'_{it}\beta)) + (1 - y_{it})\ln\,(1 - \phi(X'_{it}\beta))] \quad (8)$$

Where $LL(\theta)$ is the log-likelihood function which is a function of the set of parameters θ.

N and T represents the total number of cross-section observations (O&G companies) under study, and the total time period, and the remaining variables are as defined.

To determine the size of the effect of a change in the predictor on the outcome probability, the study estimates the marginal effects (MEs) and the predictive margins for the interactions. In our model, the marginal effect reflects the change in the probability of a company reporting (Sr=1) given a unit change in a regressor. From equation (7) the marginal effect for our panel probit model is estimated as shown in equation (9).

$$ME = \frac{dp_i}{dX} = \phi(X'_{it}\beta)\beta_j = F'(X'_{it}\beta) \quad (9)$$

3.5.3 RQ3: Empirical Model and Method of Analysis

3.5.3.1 Empirical Model

To address the research questions 3a, 3b, 3c, 3d, and 3e, we adopt the step-wise regression approach. This way, we address all the questions using different analytical results in separate columns of the same table or series of tables The empirical model for examining the regional differences in sustainability performance of the O&G companies is informed by the researcher's knowledge of literature and the type and structure of study data. We first develop the economic model in equation (10) which shows that sustainability performance is influenced by the reporting status of a company, corporate governance committee setup and attributes, country-level regulations and environmental stringency, and reporting quality (auditor quality) and institutional standards (use of GRI guidelines).

$$Y_{it} = f(Sr_{it},\ CG_{it},\ R_{it}, Q_{it},\ Z_{it}) \quad (10)$$

Where;

Y_{it} is the independent variable and represents sustainability performance.

Sr_{it} represents sustainability reporting by firms (reporting status)

CG_{it} represents corporate governance committee setup and committee characteristics

R_{it} represent country level regulations and environmental stringency

Q_{it} represent reporting quality and institutional standards
z_{it} represent all other controls including firm-level control variables
i and t are cross-section observation (O&G companies) and time period respectively.

Equation (10) is transformed into its econometric model in equations (11) below.

$$Y_{it} = \beta_0 + \beta_1 Sr_{it} + \beta_2 COM_{it} + \beta_3 Bsz_{it} + \beta_4 BGd_{it} + \beta_5 BI_{it} + \beta_6 CEOBm_{it} + \beta_7 EPS_{it} + \beta_8 MandRpt_{it} + \beta_9 GRI_{it} + \beta_{10} AuQ_{it} + \epsilon_{it} \quad (11)$$

where the variables are as already defined. To examine the direct and indirect effects of the predictors of the model, we conduct a step-wise panel regression analysis using the ESG component scores as a dependent variable and later the composite score. We also conduct sets of interactions to examine the moderating effect of the relationship from sustainability reporting to sustainability performance. We estimate equations (12) to (15) to examine the effect of reporting status, corporate governance, country regulation on sustainability, and reporting quality and institutional standards on environmental, social, governance, and the composite ESG performance respectively. This analysis is conducted for the global panel and the regional panels separately to ascertain the global and regional dynamics.

$$EnP_{it} = \beta_0 + \beta_1 Sr_{it} + \beta_2 COM_{it} + \beta_3 Bsz_{it} + \beta_4 BGd_{it} + \beta_5 BI_{it} + \beta_6 CEOBm_{it} + \beta_7 EPS_{it} + \beta_8 MandRpt_{it} + \beta_9 GRI_{it} + \beta_{10} AuQ_{it} + \epsilon_{it} \quad (12)$$

$$SoP_{it} = \beta_0 + \beta_1 Sr_{it} + \beta_2 COM_{it} + \beta_3 Bsz_{it} + \beta_4 BGd_{it} + \beta_5 BI_{it} + \beta_6 CEOBm_{it} + \beta_7 EPS_{it} + \beta_8 MandRpt_{it} + \beta_9 GRI_{it} + \beta_{10} AuQ_{it} + \epsilon_{it} \quad (13)$$

$$GvP_{it} = \beta_0 + \beta_1 Sr_{it} + \beta_2 COM_{it} + \beta_3 Bsz_{it} + \beta_4 BGd_{it} + \beta_5 BI_{it} + \beta_6 CEOBm_{it} + \beta_7 EPS_{it} + \beta_8 MandRpt_{it} + \beta_9 GRI_{it} + \beta_{10} AuQ_{it} + \epsilon_{it} \quad (14)$$

$$ESG_{it} = \beta_0 + \beta_1 Sr_{it} + \beta_2 COM_{it} + \beta_3 Bsz_{it} + \beta_4 BGd_{it} + \beta_5 BI_{it} + \beta_6 CEOBm_{it} + \beta_7 EPS_{it} + \beta_8 MandRpt_{it} + \beta_9 GRI_{it} + \beta_{10} AuQ_{it} + \epsilon_{it} \quad (15)$$

Where Y_{it} is the dependent variable (sustainability performance) of company i at time t. As mentioned earlier, sustainability performance is measured using the EnP, SoP, GvP, and ESG. The β_i and X_i are already defined, and ϵ_{it} is the stochastic error term for the general panel, and it is assumed to have a normal distribution with zero mean and constant variance.

To examine the moderating role of board characteristics, mandatory reporting, and auditor quality on relationship between sustainability reporting and sustainability performance, we formulate three different equations based on equation (15). We include the interaction term between Sr and board characteristics (BCOM, Bsz, BGd, BI, and CEOBm) to formulate equation (19), between Sr and MandRpt to formulate equation (20), and between Sr and AuQ to formulate equation (21) as shown below. We maintain ESG scores as the main dependent variable in this analysis.

$$ESG_{it} = \beta_0 + \beta_1 Sr_{it} + \beta_2 COM_{it} + \beta_3 Bsz_{it} + \beta_4 BGd_{it} + \beta_5 BI_{it} + \beta_6 CEOBm_{it} + [Sr_{it} * (\beta_7 COM_{it} + \beta_8 Bsz_{it} + \beta_9 BGd_{it} + \beta_{10} BI_{it} + \beta_{11} CEOBm_{it})] + \beta_{12} EPS_{it} + \beta_{13} MandRpt_{it} + \beta_{14} GRI_{it} + \beta_{15} AuQ_{it} + \epsilon_{it} \quad (16)$$

$$ESG_{it} = \beta_0 + \beta_1 Sr_{it} + \beta_2 COM_{it} + \beta_3 Bsz_{it} + \beta_4 BGd_{it} + \beta_5 BI_{it} + \beta_6 CEOBm_{it} + \beta_7 EPS_{it} + \beta_8 MandRpt_{it} + \beta_9 [Sr_{it} * ManRpt_{it}] + \beta_{10} GRI_{it} + \beta_{11} AuQ_{it} + \epsilon_{it} \quad (17)$$

$$ESG_{it} = \beta_0 + \beta_1 Sr_{it} + \beta_2 COM_{it} + \beta_3 Bsz_{it} + \beta_4 BGd_{it} + \beta_5 BI_{it} + \beta_6 CEOBm_{it} + \beta_7 EPS_{it} + \beta_8 MandRpt_{it} + \beta_9 GRI_{it} + \beta_{10} AuQ_{it} + \beta_{11} [Sr_{it} * AuQ_{it}] + \epsilon_{it} \quad (18)$$

3.5.3.2 Method of Analysis: Panel Regression

To examine the determinants of sustainability performance, we make use of the panel regression analysis to estimate equation (11) above. The fixed effects model of panel data analysis is employed in examining the determinants of sustainability reporting for the O&G companies. The analysis is conducted separately for all the regions. In this analysis we control for firm characteristics, year fixed effects, regional and industry dummy where appropriate.

3.5.4 RQ4: Method of Analysis

To examine the regional differences in sustainability performance, it is important to understand the factors that contribute to performance differentials between groups. This section adopts a differential methodology from labour economics that has been used to measure differences in gender socioeconomic outcomes. The same methodology has been adopted in different fields including the health sciences (Sen, 2014) and in many discrimination studies (Shitsi et al., forthcoming; Słoczyński, 2020). The topic of sustainability practices and sustainable development is a global agenda, hence, extend beyond country and regional focus and require integration into country and regional agendas. The research design, and analytical approach adopted in critically examining the explained differences in regional differences in sustainability performance among pairs of regions is explained. The Oaxaca decomposition methodology is adopted in answering the RQ4. The analysis of quantitative data of companies that compares the performance of firm-level performance across regions require the implementation of the appropriate research method that is guided by the research design. For a regional comparative analysis of sustainability performance, the comparative research design is adopted

3.5.4.1 The Blinder-Oaxaca Decomposition Approach

The Blinder-Oaxaca decomposition technique is used to investigate the regional differences in sustainability performance. The Blinder-Oaxaca decomposition methodology is a regression technique developed by Blinder (1973) and Oaxaca (1973) to partition differences in outcomes

of different groups into two or three components. We make use of the two-fold Oaxaca decomposition to disentangle the total differences in sustainability performance into explained and unexplained differences.

Following from the linear multivariate econometric model in equation (11), we adopt the linear Blinder-Oaxaca decomposition method to analyze the differences in sustainability performance between companies in two sets of regions into two components: the explained and unexplained components. We begin with a general specification for two regions, A and B.

$$Y^{A}_{(i,t)} = \beta^{A}_{0} + \beta^{A}_{j}\left(X^{A}_{j(i,t)}\right)' + \mu_{(i,t)} \tag{19}$$

$$Y^{B}_{(i,t)} = \beta^{B}_{0} + \beta^{B}_{j}\left(X^{B}_{j(i,t)}\right)' + \mu_{(i,t)} \tag{20}$$

Y represents the outcome variable (sustainability performance). The superscripts A and B corresponds to region A and region B, the two groups under comparism, subscripts i and t denotes a particular cross-sectional observation (O&G companies) and time period (year). X'_j is a row vector of j predictors. β_j denotes a column vector of coefficients of all j predictor variables. It represents the relationship between the observable characteristics X and Y, and can assume any value in both models in equations (19) and (20). μ_{it} is the error term and is assumed to be normally distributed with zero mean and constant variance in both equations.

The Oaxaca specification computes differences in outcome using average values, hence we make use of the mean form of equations (19) and (20). For simplicity of notation, we ignore firm and year notations. Using the updated notations, the mean sustainability performance for each region is presented in equations (21) and (22)

$$\bar{Y}^{A} = \beta^{A}_{0} + \beta^{A}_{j}\overline{X^{A}_{j}}' + \mu \tag{21}$$

$$\bar{Y}^{B} = \beta^{B}_{0} + \beta^{B}_{j}\overline{X^{B}_{j}}' + \mu \tag{22}$$

We specify the mean differences in sustainability performance ($\bar{Y}^{A} - \bar{Y}^{B}$) by subtracting one equation from the other. We assume that region A performs better relative to region B, hence, the expression in equation (23).

$$\bar{Y}^{A} - \bar{Y}^{B} = (\beta^{A}_{0} - \beta^{B}_{0}) + \sum_{j=1}^{J}\left[\beta^{A}_{j}\left(\overline{X^{A}_{j}}\right)' - \beta^{B}_{j}\left(\overline{X^{B}_{j}}\right)'\right] \tag{23}$$

The expression on the left-hand side of equation (23) is the difference in sustainability performance between the two regions. The expression on the right-hand side show that the differences in sustainability performance can result from differences in the coefficients (first

term on the right-hand side) and the differences in the average observable characteristic of the O&G companies (the mean values of the j predictors in X over time) which is represented by the second expressions on the right-hand side. To accurately specify the actual regional performance decomposition, a hypothetical term is included to equation (23). Equation (24) involves adding and subtracting a product of the average values of the less performing group $[(\overline{X_j^B})']$ and the coefficient vector of the more performing group (β_j^A). By further manipulation we obtain the standard Oaxaca-Blinder decomposition of the difference in sustainability performance between region A and B in equation (25) below.

$$\bar{Y}^A - \bar{Y}^B = (\beta_0^A - \beta_0^B) + \sum_{j=1}^{J} \left[\beta_j^A \overline{X_j^A}' - \beta_j^B \overline{X_j^B}'\right] + \beta_j^A \overline{X_j^A}' - \beta_j^A \overline{X_j^B}' \quad (24)$$

$$\bar{Y}^A - \bar{Y}^B = \left[\sum_{j=1}^{J} \left(\overline{X_j^A}' - \overline{X_j^B}'\right) \beta_j^A\right] + \left[(\beta_0^A - \beta_0^B) + \sum_{j=1}^{J} (\beta_j^A - \beta_j^B)\overline{X_j^B}'\right] \quad (25)$$

The first term on the right-hand side of the equation represents the explained portion of the regional performance differences. The second expression represents the unexplained difference in performance and it relates to the coefficients of the model, including β_o. According to this methodology, the differences in outcomes is expected to reduce as the gap in observables characteristics reduces, but persist, but will persist because of the second expression on the right-hand side. Equation is the two-fold decomposition and its function al form is the basis for the Blinder-Oaxaca decomposition in this chapter.

3.5.4.2 Criticisms

The Blinder-Oaxaca approach has been criticized for few weaknesses including the indexing problem and the indicator variable problem (Sen, 2014). The indexing problem suggests that the choice of reference group may affect the ratio the explained to unexplained part of the outcome difference between the two groups. Similarly, the indicator variable problem refers to the sensitivity of Oaxaca results to the choice of reference for categorical predictor variables (Jann, 2008) which can affect the contribution of the intercept and differences in the coefficient estimates to the unexplained portion of the outcome differences. By expressing equation (25) in terms of the more performing group, the study can make meaningful policy recommendation for the improvement of the less performing group. This nullifies the effect of the indexing problem. The indicator variable problem is resolved by assigning the less popular category as the base or reference category for all categorical variables.

3.6 Conclusion

This chapter explained the methodological approaches adopted in answering the research questions. The decomposition analysis is adopted in examining the differences in sustainability performance of the O&G companies across four regions. The methodological approaches are based on the study objectives and the type of data employed in this study. The next chapter

presents a summary statistic of the study data. This is to provide a fair idea of the specificity of the study data and how the companies in the four regions differ or share common features on average.

Chapter Four

Descriptive Analysis

4.1 Introduction

This descriptive analysis provides an important foundation for the subsequent inferential analysis presented in the later chapters. The section is structured into two. First, descriptive statistics are used to describe the panel for variables of interest and a distribution of the statistics across the four regions. Second, a pairwise correlation matrix is presented for the global and four region panels to show the distribution of key variables across and within regions; and the relationship between the indicators of sustainability practices and performance, corporate governance characteristics, and environmental regulations, audit consulting practices, the use of reporting guidelines, and firm controls across regions and for the global panel.

4.2 Regional Statistics

4.2.1 Sustainability Reporting and Reporting Scores

Sustainability reporting is very important for the sector because of its easy association with significant social and environmental impacts. The sector has historically faced criticisms for pollution, poor labour practices, corruption, and human right abuses. Companies are increasingly demonstrating their commitment to responsible business practices through sustainability reporting. Figure 9 show that Europe dominate in sustainability reporting with 92.01% of the region's total observation reporting on its annual sustainability. This is followed by Asia with 89.34%. Both surpass the global statistic of 68.25% out of 1288 observations that published it the report. America and Oceania follow with less than 50% publication by the companies over the study period. This outcome can be linked to differences in regulatory frameworks, investor demands, corporate culture, and stakeholder pressure among other factors.

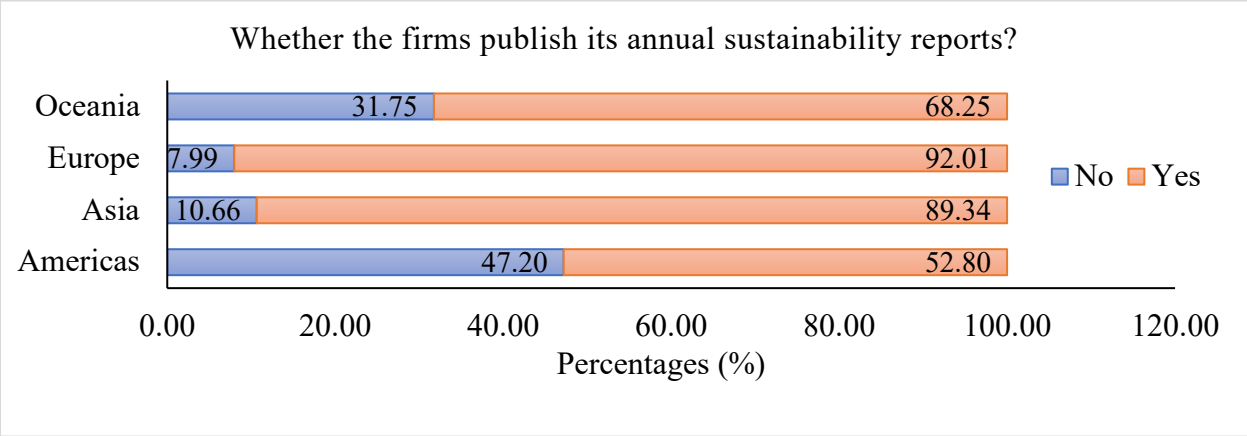


Figure 9: Sustainability reporting by regions
Source: Author's construction from data

Table 2 show that Asia and Europe recorded the highest score for sustainability reporting with mean of 56.09 and 54.75 respectively. This is followed by the Americas (42.99) and Oceania (32.23). Likewise, Asia and Europe score above the global mean of 47.39 for 161 countries for 8-years period while Americas and Oceania score below. Both between and within the companies under study, Europe recorded the least deviations in sustainability reporting scores. Asia follows with a between and within deviations of 16.57 and 7.67 respectively from the region's mean score.

Table 2: Panel statistics of sustainability reporting score by regions

Region	Panel	Mean	Std. Dev.	Minimum	Maximum	Observations.
Americas	Overall	42.99	38.87	0.00	90.72	608
	between		33.39	0.00	85.43	76
	Within		20.23	-32.32	114.98	8
		Mean	Std. Dev.	Minimum	Maximum	Observations.
Asia	Overall	56.09	18.06	0.00	92.55	272
	between		16.57	0.00	72.70	34
	Within		7.67	-4.59	98.62	8
		Mean	Std. Dev.	Minimum	Maximum	Observations.
Europe	Overall	54.75	15.25	0.00	75.00	288
	between		13.41	0.00	66.56	36
	Within		7.56	13.29	96.05	8
		Mean	Std. Dev.	Minimum	Maximum	Observations.
Oceania	Overall	32.23	38.14	0.00	85.64	120
	between		31.25	0.00	81.37	15
	Within		23.14	3.22	105.90	8

Overall Panel Statistics: Mean=47.39, N=1288, n=161, T=8

4.2.2 ESG Performance

Table 3 presents the sustainability performance of the O&G companies across the four regions using the aggregate, net (combined) and components average score for the environment, social and governance pillars (indicators or dimensions) of sustainability performance. Similar to the ranking on sustainability reporting, Europe dominate the general ESG performance with a mean score 54.90 (11.09% point above the panel average). Asia follows with 52.43% mean score while the Americas and Oceania fall below the panel average in third and fourth position. Similarly, Europe recorded the least ESG controversies and the only region with controversy score below the panel average. Nonetheless, Europe came second to Asia on the combined ESG performance. The Americas recorded the highest on the governance pillar while Europe and Asia topped in the environment and social pillar respectively. In summary, Europe beat the global average in all ESG dimensions including the composite scores (ESG, ESG controversy and ESG combined score). Relative to the global averages, Asia scores less for only ESG controversies and the governance pillar, the Americas did in only the governance pillar while Oceania scored less in all ESG measures.

Table 3: ESG performance by regions

Region	Variable	Obs.	Mean	Std. Dev.	Min	Max
Americas	ESG	608	37.69	20.94	3.73	87.94
	ESGCV	608	90.70	22.92	0.79	100.00
	ESGC	608	35.79	18.77	3.73	82.74
	EnP	608	28.33	24.41	0.00	90.23
	SoP	608	35.70	23.50	0.41	93.48
	GvP	608	54.95	23.41	0.87	97.17
			Mean	Std. Dev.	Min	Max
Asia	ESG	272	52.43	19.99	7.20	87.73
	ESGCV	272	90.66	20.88	8.73	100.00
	ESGC	272	50.71	19.41	7.20	87.73
	EnP	272	53.77	24.91	0.00	93.85
	SoP	272	54.42	23.53	9.36	92.23
	GvPS	272	46.93	22.40	2.55	92.67
			Mean	Std. Dev.	Min	Max
Europe	ESG	288	54.90	23.51	1.86	92.89
	ESGCV	288	79.81	32.48	0.93	100.00
	ESGC	288	49.03	20.20	1.86	87.82
	EnP	288	52.60	24.92	0.00	93.67
	SoP	288	57.48	26.47	1.82	95.57
	GvP	288	53.66	26.58	4.65	98.55
			Mean	Std. Dev.	Min	Max
Oceania	ESG	120	28.68	18.58	7.93	76.26
	ESGCV	120	98.86	6.54	39.68	100.00
	ESGC	120	28.66	18.56	7.93	76.26
	EnP	120	17.51	20.22	0.00	65.71
	SoP	120	26.60	20.46	3.76	85.00
	GvP	120	48.78	21.38	14.21	91.07

Overall Mean: ESG=43.81, ESGCV=89.02, ESGC=41.24, EnP=38.12, SoP=43.68, & GvP=52.39

4.2.3 Corporate Governance Committee

From Figure 10, the study data indicates that 78.95% of the observations from the Americas are reported to have a board committee, which constitutes a greater portion of the observations. In contrast, only approximately 20% to 27% of the observations in the other regions were recorded to have a board committee. Except for Oceania with 50-50 distribution, many of the observations in other regions recorded having a sustainability committee, and more than half of the observations in all regions are shown to have an audit committee.

The study observations reveal distinct patterns in the establishment of various committees among O&G companies across different regions. In the Americas, a considerable number of observations indicated the presence of board committees, sustainability committees, and audit committees. Conversely, in Asia and Europe, there were more company-year observations with

sustainability committees and audit committees than those with board committees. Notably, many observations across regions documented the existence of sustainability and audit committees while indicating a 'No' for the presence of a board committee. In Oceania, a notable trend emerged with a higher frequency on the existence for audit committee and contrasting responses for the board committee and sustainability committee.

In summation, the findings suggest a higher emphasis on the establishment of sustainability and audit committees across all regions. However, companies in the Americas appear to accord greater importance to board committees compared to their counterparts in Asia, Europe, and Oceania, as evidenced by the study data. This variation underscores potential regional differences in corporate governance practices and priorities related to committee structures within O&G companies.

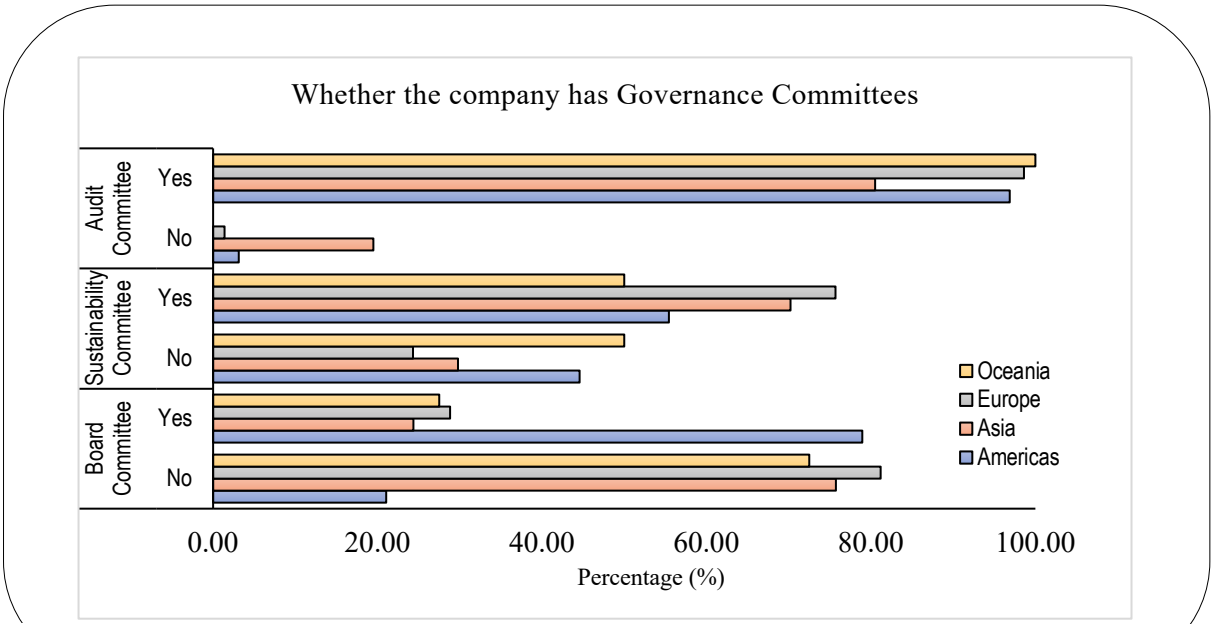


Figure 10: Distribution of the existence of Governance Committees by region
Source: Author's construction from data

4.2.3.1 Board Committee Characteristics

Table 4 to Table 6 show the characteristics of the board committees by region. In Table 5, America reported the highest in terms of companies with all three board committees (43.42% company-year observation). This is followed by Europe which also reported as the region with the highest number of O&G companies with two board committees. In terms of the size of corporate boards, Asian companies reported the highest on average (12.25) while O&G companies in Europe dominate in board gender diversity. On the contrary, O&G companies in Asia reported the least female on their board committees on average. The companies in the Americas have high independent board members on average (72.00). Table 6 also show that a greater proportion of observations (company over time) in Asia have CEOs on the corporate

board. This is followed by companies in Oceania, Americas, & Europe. This can be linked to the form of business ownerships in Asia where family businesses are particularly common and high.

Table 4: Number of board committees in the companies by by region (percentages in brackets)

Number of committees	Region				Total
	Americas	Asia	Europe	Oceania	
None	10 (1.64)	30 (11.03)	1 (0.35)	0 (0.00)	41 (3.18)
Only_1	54 (8.88)	62 (22.79)	48 (16.67)	51 (42.50)	215 (16.69)
Two Comm.	280 (46.05)	126 (46.32)	180 (62.50)	45 (37.50)	631 (48.99)
All_3	264 (43.42)	54 (19.85)	59 (20.49)	24 (20.00)	401 (31.13)
Total	608	272	288	120	1288

The column total is 100 percent

Table 5: Board committee characteristics by regions

Region	Variable	Obs	Mean	Std. Dev.	Min	Max
Americas	Bsz	608	8.74	2.54	4.00	21.00
	BGd	608	13.52	10.98	0.00	50.00
	BI	608	72.00	20.64	0.00	94.12
			Mean	Std. Dev.	Min	Max
Asia	Bsz	272	12.25	3.63	3.00	22.00
	BGd	272	10.39	10.76	0.00	44.44
	BI	272	37.72	16.35	0.00	80.95
			Mean	Std. Dev.	Min	Max
Europe	Bsz	288	10.65	3.90	4.00	26.00
	BGd	288	18.89	16.78	0.00	60.00
	BI	288	48.82	25.08	0.00	100.00
			Mean	Std. Dev.	Min	Max
Oceania	Bsz	120	6.02	2.17	3.00	11.00
	BGd	120	18.89	12.08	0.00	42.86
	BI	120	67.48	18.49	0.00	100.00

Overall panel mean: Bsz=9.65, BGd=14.65, & BI=59.16

Table 6: CEO is a member of the Board Committee, by region (percentages in brackets)

Is CEO as board member?	Regions				Total
	Americas	Asia	Europe	Oceania	
No	75 (12.50)	20 (8.97)	56 (21.37)	12 (10.81)	163 (13.63)
Yes	525 (87.50)	203 (91.03)	206 (78.63)	99 (89.19)	1033 (86.37)
Total	600	223	262	111	1,196

The column total is 100 percent

4.2.4 Country Regulations on the Environment and Reporting

4.2.4.1 Environmental Policy Stringency Index

Table 7 present the regional statistics for OECD environmental policy stringency index. A mean value of 3.05 implies that environmental policies in Europe is more stringent relative to the other regions. Environmental policies in Europe put higher implicit and explicit price on environmentally harmful behaviours. This is followed by Asia, Oceania, and the Americas. The country with the highest policy stringency (4.89) over the 8-year period is in Europe (France). The implication is that O&G companies in countries with high environmental policy stringency have high likelihood of reducing environmentally harmful behaviours. This has implication for their sustainability reporting, hence, performance. O&G companies in Europe are expected to perform better than their counterpart in other regions all things being equal.

Table 7: Environmental Policy Stringency Index (EPSI) by Region

Region	Obs	Mean	Std. Dev.	Min	Max
Americas	608	2.64	0.54	0.58	3.19
Asia	272	2.92	0.55	0.75	3.94
Europe	288	3.05	1.05	1.08	4.89
Oceania	120	2.65	0.50	0.78	2.92

Overall Panel Mean: 2.79, N=1288, & n=161

4.2.4.2 Mandatory Reporting

Europe and Oceania houses countries that have mandated reporting of non-financial activities for the periods under consideration. Table 8 shows that, of the 288 observations in Europe (36 companies for 8 years), 206 (71.53%) are reported to operate in countries where reporting is mandated. Like companies operating in Europe, the data suggests that 93.33% of the total observations under Oceania operate in countries where reporting is mandated. The opposite is true for companies operating in the Americas and Asia where reporting is not mandated for majority of the observations.

Table 8: Country Regulation of Sustainability by region (percentages in brackets)

Is Reporting mandatory?	Region				Total
	Americas	Asia	Europe	Oceania	
No	457 (75.16)	151 (55.51)	82 (28.47)	8 (6.67)	698 (54.19)
Yes	151 (24.84)	121 (44.49)	206 (71.53)	121 (93.33)	590 (45.81)
Total	608	272	288	120	1288

The column total is 100 percent

4.2.5 Reporting Quality and Institutional Standards

We measured reporting quality with the type of external auditor consulting, whether by Top4 or non-Top4 auditing companies, and the GRI guideline served as the instructional standard for reporting. We first analyse the sustainability committees score and look at the adoption of the GRI standards by the firms over the period of study.

4.2.5.1 Sustainability Committee Characteristics and use of GRI Guidelines

Table 9 show that on average, O&G companies in Europe score above 50 percent for sustainability committee and above the global average of 50.02 percent. This means that the board manager or senior managers responsible for decision making on CSR strategy in the O&G companies in Europe score higher than their comparators in Asia, Americas, and Oceania. Table 10 indicate that more than half of the observations from Asia, Europe, and Americas adopt the GRI Guidelines relative to only 41.167 percent from Oceania. Also, the American observations score more for the quality of GRI implementation than Oceania, while Asia and America score highest.

Table 9: Sustainability committee characteristics by region

Region	Variable	Obs.	Mean	Std. Dev.	Min	Max
Americas	SusComS	608	45.11	39.01	0.00	92.59
	GRIGLinesS	608	35.51	40.90	0.00	94.37
			Mean	Std. Dev.	Min	Max
Asia	SusComS	272	46.97	30.50	0.00	95.00
	GRIGLinesS	272	54.53	33.03	0.00	88.28
			Mean	Std. Dev.	Min	Max
Europe	SusComS	288	54.02	29.02	0.00	87.50
	GRIGLinesS	288	51.57	33.23	0.00	92.06
			Mean	Std. Dev.	Min	Max
Oceania	SusComS	120	39.87	39.76	0.00	84.47
	GRIGLinesS	120	26.02	37.62	0.00	92.14

Overall Panel Mean: SusComS=50.02, GRIGLinesS=57.19

Table 10: The use of GRI Guidelines by region (percentages in brackets)

Does the company adopt GRI guidelines	Region				Total
	Americas	Asia	Europe	Oceania	
No	282 (46.38)	64 (23.53)	72 (25.00)	70 (58.33)	488 (37.89)
Yes	326 (53.62)	208 (76.47)	216 (75.00)	50 (41.67)	800 (62.11)
Total	608	272	288	120	1288

The column total is 100 percent

4.2.5.2 CSR External Auditor Type

The study data had high number of missing values for CSR sustainability external auditor type (Name of external auditor). The 'not reported' value show the number of missing values. This was replaced with neighbouring values where necessary and zero when the there was no value for a firm for the study period (8 years) in the final data. Table 11 show that O&G companies in Europe on average employed more top tier (top four) external auditors across regions. Europe also have more of its O&G companies employ more auditors (both top four and total external auditor consulting) than companies in the other regions. In the probit regression section of the data analysis, external auditors referred to this three classification while in the panel regression, we focused on Top4 and non-Top4. Non-Tp4 referred to all other external auditor other than Top4, including "none". The rational is that, the likelihood of firm consulting Top4 auditors is high relative to others. Hence, in the panel regression, we use two classification of firms that report by Top4 the proportion of auditor to total observation without distinction of the type of auditor. This does not affect the study results since the regional statistics in terms of dominance in each category is the same with Europe leading, followed by Asia and Oceania, then the Americas.

Table 11: External Auditor Types by region (percentages in bracket)

External Auditor type	Region				Total
	Americas	Asia	Europe	Oceania	
Not Reported	437 (71.88)	98 (36.03)	86 (29.86)	89 (74.17)	710 (55.12)
Other	144 (23.68)	90 (33.09)	69 (23.96)	4 (3.33)	307 (23.84)
Top_4	27 (4.44)	84 (30.88)	133 (46.18)	27 (22.50)	271 (21.04)
Total	608	272	288	120	1288

The columns total is 100 percent

4.2.6 Firm-Specific Controls

In Table 12, it is noted that Americas house the oldest or longest existing company (139 years in operation) followed by Europe, Oceania, and Asia with 112, 86, and 81 years of age respectively. However, Asia has the oldest O&G company on average with mean age of 36 years. Asia and Europe house the largest O&G company (maximum size of 26.70 and 26.74 respectively) and the regions with the greatest mean size (23.29 and 23.09 respectively). Asia recorded the highest ROE on average, followed by Europe. Both the Americas and Oceania reported negative mean ROE. A leverage ratio greater than 1 is an indication that the O&G companies in the Americas and Oceania on average finances their assets with more debt that equity. A mean value of 0.8 for leverage ratio implies that O&G companies in Asia and Europe are majorly financed through equity.

Table 12: Internal corporate factors (controls) by region

Region	Variable	Obs	Mean	Std. Dev.	Min	Max
Americas	Age	608	31.28	29.45	4.00	139.00
	Size	608	21.86	2.07	15.43	26.62
	ROE	608	-0.15	2.41	-30.82	38.35
	Lev	608	1.26	4.17	0.00	56.08
			Mean	Std. Dev.	Min	Max
Asia	Age	272	36.06	19.82	4.00	81.00
	Size	272	23.29	1.51	20.35	26.70
	ROE	272	0.10	0.13	-0.61	0.57
	Lev	272	0.82	0.98	0.00	8.78
			Mean	Std. Dev.	Min	Max
Europe	Age	288	28.69	22.31	4.00	112.00
	Size	288	23.09	2.25	17.74	26.74
	ROE	288	0.02	0.35	-3.16	1.23
	Lev	288	0.82	1.68	0.00	23.52
			Mean	Std. Dev.	Min	Max
Oceania	Age	120	35.97	21.43	6.00	86.00
	Size	120	19.62	2.52	10.65	24.12
	ROE	120	-0.61	3.06	-25.47	1.41
	Lev	120	1.18	4.86	0.00	45.51

Overall Panel Mean: Age=32.15, Size=22.23, ROE=-0.10, & Lev=1.06

4.3 Correlation Matrix

Table 13 show the pairwise correlation between the study variables for the entire panel consisting of data on the four regions. The table show a strong positive association between the ESG and ESGC and between ESG and its pillar scores – EnP, SoP, and GvP. The association is obvious since the other variables are additive components of the ESG. Corporate size (SZ) is shown to have a strong positive correlation with ESG and its pillar components, but a negative association with ESGCV. While there is a strong association between the environmental pillar score, social pillar score, ESG score and ESG combined score, the governance pillar shows a weak positive association with the these scores and also with Sr. Similar directional relationship is shown for external auditors and the ESG scores. A strong positive relationship is shown between sustainability reporting and reporting score on one hand, and the ESG scores (excluding ESGCVS), and the adoption of GRIG on the other hand. The ESGCV is shown to have a negative relationship with many of the study variables. A weak negative relationship is shown between mandatory reporting and national environmental performance in general.

Table 14, Table 15, Table 16, and Table 17 show the pairwise correlation for the Americas, Asia, Europe, and Oceania panels respectively. Like the global panel, similar association in terms of strength and direction are shown for these panels with few exceptions. For instance,

contrary to the global panel, the Asia panel show a weak association between corporate size and sustainability reporting and its associated scores. It also shows a negative relationship between mandatory reporting and the regions average level of environmental stringency. This is contrary to a positive relationship shown for the global panel. Table 16 and Table 17show a positive relationship between mandatory reporting and the average environmental performance for Europe and Oceania respectively.

The correlation tables presented in Table 13 to Table 17 indicate that there is no problem of multicollinearity. The correlation coefficients are relatively low and below the upper bound of 0.9 (Kennedy, 2008).

Table 13: Pairwise Correlation Matrix of Study Variables for the Global Panel

Variables		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1)	Sr	1.000									
(2)	ESG	0.710	1.000								
(3)	ESGCV	-0.257	-0.443	1.000							
(4)	ESGC	0.703	0.937	-0.145	1.000						
(5)	EnP	0.721	0.937	-0.413	0.881	1.000					
(6)	SoP	0.656	0.951	-0.447	0.885	0.875	1.000				
(7)	GvP	0.380	0.617	-0.229	0.584	0.401	0.425	1.000			
(8)	COM	0.166	0.332	-0.155	0.320	0.221	0.320	0.352	1.000		
(9)	Bsz	0.419	0.558	-0.237	0.539	0.611	0.555	0.145	0.152	1.000	
(10)	BGd	0.173	0.268	-0.223	0.186	0.199	0.223	0.315	0.194	-0.039	1.000
(11)	BI	-0.150	0.064	-0.098	0.025	-0.070	-0.015	0.406	0.502	-0.200	0.294
(12)	CEOBm	-0.051	-0.085	-0.027	-0.105	-0.061	-0.110	-0.030	0.141	0.031	-0.069
(13)	EPS	0.041	0.039	-0.009	0.027	0.070	0.009	0.023	0.050	0.033	0.206
(14)	MandRpt	0.098	0.043	-0.015	0.025	0.034	0.088	-0.054	-0.019	-0.097	0.233
(15)	GRIG	0.595	0.712	-0.249	0.715	0.674	0.686	0.409	0.253	0.418	0.097
(16)	AuQ	0.462	0.682	-0.318	0.639	0.672	0.650	0.362	0.162	0.515	0.169
(17)	SZ	0.544	0.726	-0.483	0.632	0.734	0.684	0.371	0.207	0.586	0.165
(18)	Age	0.159	0.234	-0.234	0.149	0.271	0.219	0.062	-0.081	0.139	0.187
(19)	LEV	-0.086	-0.094	0.039	-0.091	-0.093	-0.077	-0.074	-0.066	-0.050	-0.019
(20)	ROe	0.110	0.098	-0.008	0.103	0.101	0.111	0.011	0.065	0.053	0.024

Continuation of Table 13

		(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(11)	BI	1.000									
(12)	CEOBm	0.150	1.000								
(13)	EPS	0.081	0.031	1.000							
(14)	MandRpt	-0.085	0.026	-0.135	1.000						
(15)	GRIG	-0.021	-0.069	-0.138	0.133	1.000					
(16)	AuQ	-0.063	-0.074	0.048	0.093	0.499	1.000				
(17)	SZ	-0.029	-0.058	0.020	-0.107	0.532	0.604	1.000			
(18)	Age	-0.022	-0.006	0.038	0.010	0.062	0.141	0.221	1.000		
(19)	LEV	0.040	-0.105	0.052	-0.047	-0.110	-0.084	-0.034	-0.077	1.000	
(20)	ROe	-0.051	-0.026	0.028	-0.004	0.089	0.080	0.105	0.047	-0.173	1.000

Table 14: Pairwise Correlation Matrix of Study Variables for Americas

Variables		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(21)	Sr	1.000									
(22)	ESG	0.779	1.000								
(23)	ESGCV	-0.293	-0.456	1.000							
(24)	ESGC	0.774	0.946	-0.194	1.000						
(25)	EnP	0.773	0.942	-0.460	0.878	1.000					
(26)	SoP	0.698	0.945	-0.471	0.877	0.880	1.000				
(27)	GvP	0.529	0.670	-0.187	0.686	0.475	0.458	1.000			
(28)	COM	0.252	0.343	-0.094	0.368	0.266	0.292	0.373	1.000		
(29)	Bsz	0.365	0.519	-0.337	0.463	0.490	0.489	0.348	0.201	1.000	
(30)	BGd	0.370	0.436	-0.238	0.392	0.415	0.360	0.381	0.381	0.159	1.000
(31)	BI	0.028	0.152	-0.096	0.150	0.118	0.041	0.326	0.563	-0.011	0.355
(32)	CEOBm	-0.120	-0.085	-0.034	-0.113	-0.076	-0.149	0.060	0.307	-0.055	0.216
(33)	EPS	-0.093	-0.106	-0.028	-0.124	-0.095	-0.130	-0.026	0.159	-0.074	0.170
(34)	MandRpt	0.101	0.090	0.168	0.149	0.120	0.102	-0.024	0.091	-0.018	0.098
(35)	GRIG	0.653	0.672	-0.198	0.700	0.644	0.648	0.411	0.245	0.354	0.243
(36)	AuQ	0.460	0.634	-0.406	0.558	0.607	0.585	0.436	0.292	0.488	0.378
(37)	SZ	0.562	0.760	-0.518	0.669	0.751	0.728	0.438	0.312	0.529	0.387
(38)	Age	0.155	0.283	-0.323	0.167	0.326	0.282	0.073	-0.122	0.194	0.144
(39)	LEV	-0.091	-0.101	0.030	-0.102	-0.083	-0.065	-0.139	-0.108	-0.037	-0.072
(40)	ROe	0.087	0.084	0.016	0.092	0.079	0.108	0.004	0.075	-0.006	0.070

Continuation of Table 14

		(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(21)	BI	1.000									
(22)	CEOBm	0.462	1.000								
(23)	EPS	0.291	0.217	1.000							
(24)	MandRpt	-0.079	-0.037	-0.385	1.000						
(25)	GRIG	0.017	-0.084	-0.269	0.344	1.000					
(26)	AuQ	0.201	0.043	-0.104	0.102	0.397	1.000				
(27)	SZ	0.187	-0.015	-0.017	-0.060	0.491	0.618	1.000			
(28)	Age	-0.099	-0.047	0.032	-0.056	0.030	0.230	0.308	1.000		
(29)	LEV	-0.043	-0.164	0.053	-0.085	-0.095	-0.068	-0.008	-0.087	1.000	
(30)	ROe	0.003	-0.022	0.029	0.029	0.065	0.077	0.067	0.039	-0.074	1.000

Table 15: Pairwise Correlation Matrix of Study Variables for Asia

Variables		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(41)	Sr	1.000									
(42)	ESG	0.565	1.000								
(43)	ESGCV	-0.149	-0.245	1.000							
(44)	ESGC	0.552	0.957	0.010	1.000						
(45)	EnP	0.565	0.899	-0.177	0.887	1.000					
(46)	SoP	0.450	0.917	-0.281	0.864	0.753	1.000				
(47)	GvP	0.380	0.609	-0.114	0.565	0.370	0.376	1.000			
(48)	COM	0.183	0.624	-0.261	0.567	0.520	0.704	0.200	1.000		
(49)	Bsz	0.162	0.313	-0.015	0.320	0.395	0.274	0.030	0.361	1.000	
(50)	BGd	0.048	-0.088	0.005	-0.107	-0.197	-0.006	-0.001	-0.009	-0.159	1.000
(51)	BI	0.244	0.539	-0.125	0.500	0.352	0.543	0.453	0.564	0.140	0.138
(52)	CEOBm	0.544	0.355	-0.134	0.337	0.385	0.220	0.325	0.201	0.232	-0.051
(53)	EPS	-0.048	-0.019	0.239	0.043	0.054	-0.166	0.150	-0.095	0.115	0.120
(54)	MandRpt	-0.002	-0.106	-0.190	-0.148	-0.243	0.016	-0.035	0.052	-0.294	0.050
(55)	GRIG	0.595	0.741	-0.249	0.714	0.651	0.703	0.429	0.483	0.184	-0.089
(56)	AuQ	0.212	0.529	-0.160	0.502	0.503	0.422	0.395	0.254	0.284	-0.257
(57)	SZ	0.169	0.374	-0.321	0.312	0.347	0.320	0.252	0.280	0.285	-0.308
(58)	Age	0.309	0.070	-0.102	0.058	0.211	0.032	-0.138	-0.174	-0.031	0.064
(59)	LEV	-0.260	-0.182	0.056	-0.174	-0.180	-0.114	-0.184	-0.088	-0.117	0.251
(60)	ROe	-0.057	-0.019	0.000	-0.017	0.006	0.053	-0.183	0.082	-0.026	-0.174

Continuation of Table 15

		(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(31)	BI	1.000									
(32)	CEOBm	0.263	1.000								
(33)	EPS	0.087	-0.065	1.000							
(34)	MandRpt	0.001	0.096	-0.560	1.000						
(35)	GRIG	0.284	0.325	-0.160	0.095	1.000					
(36)	AuQ	0.087	0.063	0.135	-0.107	0.496	1.000				
(37)	SZ	0.156	0.053	-0.058	0.149	0.389	0.487	1.000			
(38)	Age	-0.183	0.213	-0.172	-0.037	-0.009	-0.136	-0.258	1.000		
(39)	LEV	0.003	-0.529	0.032	-0.141	-0.261	-0.199	0.049	0.048	1.000	
(40)	ROe	-0.071	0.038	-0.297	0.270	-0.023	0.004	-0.044	0.130	-0.242	1.000

Table 16: Pairwise Correlation Matrix of Study Variables for Europe

Variables		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(61)	Sr	1.000									
(62)	ESG	0.443	1.000								
(63)	ESGCV	-0.166	-0.501	1.000							
(64)	ESGC	0.429	0.857	-0.028	1.000						
(65)	EnP	0.397	0.936	-0.483	0.789	1.000					
(66)	SoP	0.438	0.952	-0.481	0.831	0.863	1.000				
(67)	GvP	0.340	0.781	-0.366	0.660	0.610	0.617	1.000			
(68)	COM	0.366	0.412	-0.232	0.341	0.317	0.447	0.320	1.000		
(69)	Bsz	0.256	0.516	-0.210	0.496	0.603	0.565	0.109	0.187	1.000	
(70)	BGd	-0.157	0.289	-0.283	0.119	0.237	0.208	0.390	0.181	-0.069	1.000
(71)	BI	0.214	0.527	-0.338	0.379	0.433	0.442	0.601	0.275	0.058	0.484
(72)	CEOBm	-0.137	-0.269	-0.047	-0.349	-0.236	-0.221	-0.299	-0.102	0.107	-0.368
(73)	EPS	-0.175	-0.070	0.030	-0.128	-0.148	-0.084	0.092	0.158	-0.397	0.437
(74)	MandRpt	-0.158	-0.094	-0.086	-0.208	-0.129	-0.074	-0.044	0.168	-0.059	0.400
(75)	GRIG	0.244	0.740	-0.309	0.705	0.728	0.747	0.453	0.288	0.514	-0.014
(76)	AuQ	0.310	0.751	-0.306	0.717	0.744	0.728	0.507	0.258	0.547	0.184
(77)	SZ	0.233	0.705	-0.567	0.488	0.750	0.629	0.503	0.089	0.488	0.193
(78)	Age	-0.123	0.246	-0.276	0.062	0.255	0.253	0.124	0.102	0.175	0.410
(79)	LEV	0.082	0.035	0.074	0.075	-0.012	-0.025	0.191	0.077	0.004	0.088
(80)	ROe	-0.009	0.013	-0.011	-0.002	0.078	0.015	-0.085	0.029	0.052	-0.124

Continuation of Table 16

		(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(41)	BI	1.000									
(42)	CEOBm	-0.282	1.000								
(43)	EPS	0.389	-0.281	1.000							
(44)	MandRpt	0.232	0.126	0.607	1.000						
(45)	GRIG	0.262	-0.137	-0.196	-0.222	1.000					
(46)	AuQ	0.342	-0.297	-0.210	-0.248	0.634	1.000				
(47)	SZ	0.245	-0.111	-0.421	-0.369	0.535	0.653	1.000			
(48)	Age	0.263	0.005	0.290	0.275	0.031	0.236	0.256	1.000		
(49)	LEV	0.131	0.029	0.137	0.180	-0.026	-0.014	-0.016	-0.064	1.000	
(50)	ROe	-0.091	-0.059	-0.172	-0.185	0.053	0.076	0.113	0.019	-0.386	1.000

Table 17: Pairwise Correlation Matrix of Study Variables for Oceania

Variables		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(81)	Sr	1.000									
(82)	ESG	0.701	1.000								
(83)	ESGCV	-0.208	-0.248	1.000							
(84)	ESGC	0.700	1.000	-0.239	1.000						
(85)	EnP	0.729	0.940	-0.300	0.939	1.000					
(86)	SoP	0.621	0.948	-0.251	0.948	0.869	1.000				
(87)	GvP	0.516	0.771	-0.073	0.772	0.604	0.591	1.000			
(88)	COM	0.586	0.614	-0.136	0.614	0.559	0.539	0.573	1.000		
(89)	Bsz	0.588	0.743	-0.294	0.742	0.760	0.676	0.537	0.613	1.000	
(90)	BGd	0.326	0.491	-0.117	0.490	0.462	0.450	0.403	0.188	0.277	1.000
(91)	BI	0.197	0.406	-0.075	0.406	0.367	0.382	0.338	0.354	0.424	0.124
(92)	CEOBm	-0.048	-0.044	-0.064	-0.045	-0.082	0.080	-0.191	-0.044	-0.140	-0.002
(93)	EPS	0.089	0.034	0.026	0.035	0.058	0.044	-0.028	0.057	-0.022	0.128
(94)	MandRpt	0.023	0.011	-0.047	0.011	-0.029	0.060	-0.022	0.141	-0.184	-0.082
(95)	GRIG	0.451	0.595	-0.020	0.596	0.546	0.466	0.643	0.385	0.510	0.228
(96)	AuQ	0.441	0.643	-0.034	0.644	0.604	0.643	0.439	0.579	0.609	0.205
(97)	SZ	0.669	0.797	-0.279	0.796	0.838	0.747	0.507	0.551	0.880	0.385
(98)	Age	0.629	0.671	-0.210	0.670	0.746	0.590	0.437	0.245	0.603	0.335
(99)	LEV	0.019	-0.104	0.023	-0.104	-0.102	-0.079	-0.107	-0.187	-0.026	-0.058
(100)	ROe	0.134	0.155	-0.034	0.155	0.140	0.152	0.120	0.180	0.062	0.048

Continuation of Table 17

		(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(51)	BI	1.000									
(52)	CEOBm	0.146	1.000								
(53)	EPS	0.012	0.129	1.000							
(54)	MandRpt	0.257	0.688	0.196	1.000						
(55)	GRIG	0.281	-0.326	-0.089	-0.316	1.000					
(56)	AuQ	0.270	0.144	0.036	0.154	0.360	1.000				
(57)	SZ	0.403	-0.094	0.020	-0.107	0.567	0.581	1.000			
(58)	Age	0.165	-0.256	0.001	-0.257	0.535	0.391	0.700	1.000		
(59)	LEV	0.109	0.070	0.140	0.046	-0.155	-0.103	-0.059	-0.119	1.000	
(60)	ROe	-0.091	-0.063	-0.027	-0.044	0.166	0.121	0.123	0.163	-0.496	1.000

4.4 Conclusion

This chapter presented a summary of the study data by way of summary and descriptive statistics. It described the nature of the study variables by regions. From the descriptive statistics Asia and Europe are reported to dominate in average or proportionate share of key variables relative to the companies in the Americas and Oceania. The O&G companies in Europe dominate with the highest ESG score, social pillar score, gender diversity, sustainability committee, sustainability reporting and reported the least ESG controversies over the period under study. Asia reported the largest company on average, most to adopt the GRI guidelines, and recorded the highest mean score for sustainability reporting and for the environmental pillar. On the contrary, a high proportion of the O&G companies in the Americas have board committees and have the highest proportion of independent members on their board committees relative to their comparators in other regions. All things being equal, O&G companies in America have a higher corporate board committee. The empirical result for the study is discussed in the next three chapters.

Chapter Five

Results and Discussions: Differences in Sustainability Performance by Reporting Status

5.1 Introduction

This chapter is focused on addressing the first objective of the study – if differences exist in the sustainability performance between O&G companies that publish their sustainability reports. This is done for the global panel and for the regions. The RQ2 focuses on examining the determinants of sustainability reporting. Signaling theory identify that firms that perform well on their sustainability outcomes would want to signal superior performance by reporting, while less performing firms are likely not to report because they would not want to show evidence of non-commitment to social and environmental impacts to their constituents, including investors, financiers, customers, and the general stakeholders.

Before examining the determinants of sustainability reporting in the next chapter, we conduct two important analyses. First, we conduct a cross-tabulation of sustainability reporting against the key predictors including sustainability performance (ESG and component scores), board characteristics (COM, Bsz, BGd, BI, CEOBm), country level regulations (EPS and MandRpt), country-level environmental policy and sustainability regulation (i.e. consulting Top4 auditors and adoption of GRI guidelines), and firm-specific controls (BS, firm age, leverage, and profitability (ROE)) to ascertain how the O&G companies vary across regions in key characteristics by virtue of their reporting or non-reporting status. Finally, the research question is empirically answered using the independent test for sample means for the ESG score and its component scores.

5.2 Characteristics of reporting and non-reporting O&G companies by region

5.2.1 Sustainability Performance

In this section, we compare between reporting and non-reporting companies. We examined how reporting and non-reporting firms within our study regions differ by their ESG performance and other characteristics. Table 18 indicate that reporting firms on average performed better than non-reporting firms on ESG performance, including constituent pillars. Likewise, non-reporting companies performed poorly on ESG controversies showing high ESGCV scores for all regions relative to companies that reported on their sustainability. This makes a possible case for non-reporting following the signaling theory.

Table 18: Means of ESG performance by sustainability reporting and regions

Variable	Sr	Region				Total
		Americas	Asia	Europe	Oceania	
ESG	No	20.46	19.78	19.65	17.73	19.90
	Yes	53.09	56.33	57.95	44.02	54.94
	Total	37.69	52.43	54.90	28.68	43.81
ESGCV	No	97.80	99.66	98.10	100.00	98.32
	Yes	84.36	89.59	78.22	97.26	84.69
	Total	90.70	90.66	79.81	98.86	89.02
ESGC	No	20.43	19.78	19.65	17.73	19.88
	Yes	49.51	54.41	51.58	43.97	51.17
	Total	35.79	50.71	49.03	28.66	41.24
EnP	No	8.39	13.11	19.12	5.10	8.77
	Yes	46.15	58.62	55.51	34.88	51.78
	Total	28.33	53.77	52.60	17.51	38.12
SoP	No	18.37	23.82	18.18	15.91	18.32
	Yes	51.20	58.07	60.89	41.56	55.47
	Total	35.70	54.42	57.48	26.60	43.68
GvP	No	41.88	22.37	23.05	39.49	39.03
	Yes	66.64	49.87	56.31	58.61	58.61
	Total	54.95	46.94	25.69	52.39	52.39

5.2.2 Corporate Governance Committees by Region

5.2.2.1 Board Committees Setup and Reporting Status

In Table 19, a greater proportion of companies in America, Asia, and Europe that have corporate governance committees report on their sustainability impact. In addition, this group constituted the majority for all combination of corporate governance committee setup and sustainability reporting for Europe. Furthermore, Europe dominate in this category in comparison with the other regions. For instance, 100%, 97.25%, and 91.90% of the reporting companies have a board committee, sustainability committee and audit committee respectively. This compares higher above 49.58%, 75.67%, and 51.44% for America, and a little higher than that of Asia respectively (100%, 92.67%, and 89.50).

Table 19: Corporate Governance Committees by sustainability reporting and region

Region	Sr	BCom		SusCom		AudCom	
		No	Yes	No	Yes	No	Yes
Americas	No	45 (35.16)	242 (50.42)	205 (75.65)	82 (24.33)	1 (5.26)	286 (48.56)
	Yes	83 (64,84)	238 (49.58)	66 (24.35)	255 (75.67)	18 (94.74)	303 (51.44)
	Total	128	480	271	337	19	589
Asia	No	29 (14.08)	0 (0.00)	15 (18.52)	14 (7.33)	6 (11.32)	23 (10.50)
	Yes	177 (85.92)	66 (100.00)	66 (81.48)	177 (92.67)	47 (88.68)	196 (89.50)
	Total	206	66	81	191	53	219
Europe	No	23 (11.22)	0 (0.00)	17 (24.29)	6 (2.75)	0 (0.00)	23 (8.10)
	Yes	182 (88.78)	83 (100.00)	53 (75.71)	212 (97.25)	4 (100)	261 (91.90)
	Total	210	83	70	218	4	284
Oceania	No	59 (67.82)	11 (33.33)	53 (88.33)	17 (28.33)	0 (0.00)	70 (58.33)
	Yes	28 (32.18)	22 (66.67)	7 (11.67)	43 (71.67)	0 (0.00)	50 (41.67)
	Total	87	33	60	60	0	120

Column percentages in parenthesis, and add up to 100.00

5.2.2.2 Corporate Board Characteristics and Reporting Status

Table 20 show the average board size, composition of women on corporate boards (BGd), and proportion of independent members on corporate boards (BI) of the O&G companies for each region and the global panel in general. For all regions and for the global panel, in average, companies that report on their sustainability activities are appear to be bigger in size, higher in terms of gender diversity (composition of women on corporate board) and on the independence of board members. Asian O&G companies are shown to be bigger in size, while European companies are more gender diverse (higher proportion of women on corporate board) while American companies dominate in terms of board independence. For the global panel in general, reporting companies on average are bigger higher proportion of female directors, but are less independent compared to non-reporting companies.

Table 20: Average Bsz, BGd, & BI by sustainability reporting and regions

Variable	Sr	Region				Total
		Americas	Asia	Europe	Oceania	
Bsz	No	7.76	10.55	7.26	4.94	7.44
	Yes	9.61	12.45	10.94	7.52	10.68
	Total	8.74	12.25	10.65	6.02	9.65
BGd	No	9.23	8.89	28.23	15.57	11.36
	Yes	17.35	10.56	18.51	23.52	16.18
	Total	13.52	10.39	19.29	18.88	14.65
BI	No	71.39	26.17	30.64	64.41	64.70
	Yes	72.54	39.09	50.40	71.76	56.57
	Total	72.00	37.72	48.82	67.48	59.15

5.2.3 Country-level Environmental Policy and Sustainability Regulation

Table 21 and Table 22 show the cross-tabulations for Environmental Policy Stringency Index (EPSI) and mandatory reporting by sustainability reporting and region respectively. Reporting companies in Europe are show to originate in countries that have low average EPSI relative to non-reporting companies in Europe. This implies that on average, reporting does not necessarily have a link with the environmental policy stringency. Apart from Europe where differences in mean policy stringency index between reporting and non-reporting companies is approximately 0.98 indices, the difference is at most 0.56 for the other regions.

In addition, for all the companies that published their sustainability reports, it is only in Europe that majority of the companies are from countries that are under no obligation to report on their sustainability outcomes. This implies that companies in Europe are engaged in more voluntary reporting, all things being equal. In other words, apart from companies in the European region, many of the companies that reported are from countries where sustainability reporting is mandated.

Table 21: Mean EPSI by sustainability reporting and region

SusRpt	Region				Total
	Americas	Asia	Europe	Oceania	
No	2.713	2.380	3.944	2.620	2.767
Yes	2.556	2.944	2.963	2.703	2.796
Total	2.638	2.922	3.051	2.651	2.785

Table 22: Mandatory reporting by sustainability reporting and region

Region	Sr	No (Voluntary)		Yes (mandatory)		Total	
		Freq.	Perc	Freq.	Perc	Freq.	Perc
Americas	No	229	50.11	58	47.20	287	47.20
	Yes	228	49.89	93	52.80	321	52.80
	Total	**457**	**100.00**	**151**	**100.00**	**608**	**100.00**
Asia	No	16	10.60	13	10.74	29	10.66
	Yes	135	89.40	108	89.26	243	89.34
	Total	**151**	**100.00**	**121**	**100.00**	**272**	**100.00**
Europe	No	1	1.22	22	10.68	23	7.99
	Yes	81	98.78	184	89.32	265	92.01
	Total	**82**	**100.00**	**206**	**100.00**	**288**	**100.00**
Oceania	No	5	62.50	65	58.04	70	58.33
	Yes	3	37.50	47	41.96	50	41.67
	Total	**8**	**100.00**	**112**	**100.00**	**120**	**100.00**

5.2.4 Auditor Quality and Institutional Standards/Guidelines

5.2.4.1 Auditor Quality

In Table 23, majority of the companies across regions are shown to have "none-response" on the question pertaining to their external auditor. However, majority of the companies that have external auditors are reported to have published their sustainability reports. Most O&G companies in the Americas and Oceania that did not publish their sustainability report did not have external auditors or at least did not mention their external auditors. Relative to companies in other regions, and on the average Europe has the highest observation (company-year) that are audited by Top_4. This means that Europe has more companies audited by Top4 or are more audited by Top4 over the period.

Table 23: External Auditor by sustainability reporting and region

Region	Sr	None		Other		Top 4		Total	
		Freq.	Perc	Freq.	Perc	Freq.	Perc	Freq.	Perc
Americas	No	271	62.01	16	11.11	0	0.00	287	47.20
	Yes	166	37.99	128	88.89	27	100.00	321	52.80
	Total	**437**	**100.00**	**144**	**100.00**	**27**	**100.00**	**608**	**100.00**
Asia	No	22	22.45	1	1.11	6	7.14	29	10.66
	Yes	76	77.55	89	98.89	78	92.86	243	89.34
	Total	**98**	**100.00**	**90**	**100.00**	**84**	**100.00**	**272**	**100.00**
Europe	No	20	23.26	0	0.00	3	2.26	23	7.99
	Yes	66	76.74	69	100.00	130	97.74	265	92.01
	Total	**86**	**100.00**	**69**	**100.00**	**133**	**100.00**	**288**	**100.00**
Oceania	No	64	71.91	0	0.00	6	22.22	70	58.33
	Yes	25	28.09	4	100.00	21	77.78	50	41.67
	Total	**89**	**100.00**	**4**	**100.00**	**27**	**100.00**	**120**	**100.00**

5.2.2 Firm-Specific controls

Table 24 show that reporting companies are averagely bigger in terms of the size of their total assets (Size). For all the regions except Europe, companies that report on their sustainability are older than their non-reporting counterparts on average. They have been in business longer. In addition, the capital structure of reporting companies is generally less than 1, meaning that they are more equity financed. Oceanian O&G companies have more debt than equity in term of their capital structure. While both reporting and non-reporting companies in Europe and Oceania are equity and debt financed respectively, for companies in Americas and Oceania, the reporting companies are relatively less reliant on debt. In terms of return on equity (ROE), the companies are more profitable, apart for the case of Asia.

Table 24: Means of age, size, ROE, and Leverage by sustainability reporting and regions

Variable	SusRpt	Region				Total
		Americas	Asia	Europe	Oceania	
Size (SZ)	No	20.63	22.55	21.32	18.19	20.38
	Yes	22.96	23.37	23.25	21.60	23.08
	Total	21.86	23.29	23.09	19.62	22.23
Age	No	26.45	18.34	38.00	24.63	26.21
	Yes	35.60	38.17	27.89	51.84	34.91
	Total	31.28	36.06	28.69	35.97	32.15
Leverage (LEV)	No	1.66	1.56	0.35	1.10	1.49
	Yes	0.90	0.73	0.86	1.29	0.87
	Total	1.26	0.82	0.82	1.18	1.06
Return on Equity (ROE)	No	-0.37	0.12	0.03	-0.95	-0.41
	Yes	0.05	0.09	0.02	-0.13	0.04
	Total	-0.15	0.10	0.02	-0.61	-0.10

5.3 Sustainability Performance and Reporting Status per region

To examine whether the regional differences in the ESG scores and component scores, which are key sustainability indicator variables are significantly the same for reporting and non-reporting companies in each region, we analyse the results from the independent two-sample mean tests. The results are presented separately for ESG scores and its component scores for each region from Table 25 to Table 34 below.

5.3.1 Differences in ESG scores by Reporting Status - Global Panel

Table 25 show the result for the test for mean difference in ESG scores between the reporting and non-reporting O&G companies for the panel data. It is observed that reporting firms on average have ESG score of 54.94 against 19.90 for non-reporting firms, indicating a mean difference of 32.04 in favour of the companies that report on their sustainability impacts. At a

t-statistic of -36.14 and 95% C.I (-36.94, -33.14), the mean difference is shown to be significant at 1%. Hence, we reject the null hypothesis that the mean differences in ESG scores for reporting and non-reporting O&G companies are equal. We conclude that the ESG scores of O&G companies that publish their sustainability reports is averagely greater than non-reporting comparators for the global panel.

Similarly, Table 26 reports the test result for the ESG component scores – EnPS, SoPS, and GvPS. Following the mean report and test statistics for EnPS [M = -33.01, t = -37.33, 95% CI (-36.94, -33.14)], SoPS [M = -37.15, t = -31.13, 95% CI (-39.49, -34.81)], and GvPS [M = -19.59, t = -14.75, 95% CI (-22.19, -16..98)], we reject the null hypothesis of equal mean for the two group at 1% and in favour of reporting firms. Hence, reporting firms perform better than non-reporting firm on their environmental, social, and governance pillar score by the respective mean differences. This result supports follows the signaling theory that firms that are performing well on the sustainability outcomes would report to show their superior position in the market. It also confirms the findings of previous studies including Karaman et al. (2021) and Uyar et al. (2020) among other studies. We follow similar explanation to summarisse the analysis for the regions.

Table 25: Test for Mean Differences in ESG Scores – Global Panel

Group (Companies)	Obs.	Mean	Std. Err.	t (df)	[95% C.I]
Non-Reporting	409	19.90	0.45		
Reporting	879	54.94	0.62		
combined	1,288	43.81	0.64		
diff		-32.04***	0.97	-36.14 (1286)	(-36.94, -33.14)

*** denote 1% significance

Table 26: Test for Mean Differences in EnP, SoP, GvP scores – Global Panel

Var.	Group	Obs.	Mean	Std. Err.	t (df)	[95% C.I]
EnP	Non-Reporting	409	8.77	0.52		
	Reporting	879	51.78	0.75		
	diff		-33.01***	1.15	-37.33 (1286)	(-45.27, -40.75)
SoP	Non-Reporting	409	18.32	0.51		
	Reporting	879	55.47	0.78		
	diff		-37.15***	1.19	-31.13 (1286)	(-39.49, -34.81)
GvP	Non-Reporting	409	39.03	0.96		
	Reporting	879	58.61	0.79		
	diff		-19.59***	1.33	-14.75 (1286)	(-22.19, -16..98)

*** denote 1% significance

5.3.2 Differences in ESG scores by Reporting Status – The Americas

Table 27 show a significant difference in ESG scores between reporting and non-reporting O&G companies in America. With a t-statistic and degrees of freedom (-30.53 (606)) and the respective 95% C.I., the mean difference is significant at 1%, hence, showing a significant difference in ESG score of 31.31 in favour of O&G companies that report on their sustainability outcomes. Table 28 show a mean difference of in favour of sustainability reporting companies of 32.63, 37.76, and 24.76 at 1% significance for EnPS, SoPS, and GvPS respectively. This implies that there is significance difference in sustainability performance of O&G companies for reporting and non-reporting firms, hence, we reject the null hypothesis that there is no significant difference in the sustainability performance of the two groups, for both ESG performance and component scores. The signaling theory is supported by the Americas data.

Table 27: Test for Mean Differences in ESG Score – Americas

Group (Companies)	Obs.	Mean	Std. Err.	t (df)	[95% C.I]
Non-Reporting	317	20.46	0.54		
Reporting	291	53.09	0.89		
combined	608	37.69	0.85		
diff		-32.63***	1.07	-30.53 (606)	(-34.73, -30.54)

*** denote 1% significance

Table 28: Test for Mean Differences in EnP, SoP, GvP – Americas

Var.	Group	Obs.	Mean	Std. Err.	t (df)	[95% C.I]
EnP	Non-Reporting	287	8.39	0.58		
	Reporting	321	46.15	1.07		
	diff		-37.76***	1.26	-29.97 (606)	(-40.24, -35.29)
SoP	Non-Reporting	287	18.37	0.62		
	Reporting	321	51.20	1.17		
	diff		-32.83***	1.37	-23.99 (606)	(-35.52, -30.15)
GvP	Non-Reporting	287	41.88	1.17		
	Reporting	321	66.64	1.11		
	diff		-24.76***	1.62	-15.32 (606)	(-27.94, -21.59)

*** denote 1% significance

5.3.3 Differences in ESG scores by Reporting Status - Asia

Table 29 and Table 30 reports a mean difference of 36.55 and (45.51, 34.25, and 27.49) on ESG score and all the component scores (EnPS, SoPS, and GvPS) respectively, and in favour of reporting O&G companies with a t-statistics of -11.26 and (-11.25, -8.28, and -6.74). The probability value for the test of mean difference is less than 1% for all the ESG scores which

confirms that the differences in ESG scores is significant, at 1%. Again, we reject the null hypothesis of equal means of ESG score and component scores for the O&G companies in Asia. The signaling theory is confirmed. This means that companies doing well on their sustainability reports more than their less-performing comparators in the same region.

Table 29: Test for Mean Differences in ESG Scor – Asia

Group (Companies)	Obs.	Mean	Std. Err.	t (df)	[95% C.I]
Non-Reporting	29	19.78	0.97		
Reporting	243	56.33	1.11		
combined	272	52.43	1.21		
diff		-36.55***	3.25	-11.26 (270)	(-42.94, -30.16)

*** denote 1% significance

Table 30: Test for Mean Differences in EnP, SoP, GvP scores – Asia

Var.	Group	Obs.	Mean	Std. Err.	t (df)	[95% C.I]
EnP	Non-Reporting	29	13.11	1.56		
	Reporting	243	58.62	1.38		
	diff		-45.51***	4.05	-11.25 (270)	(-53.48, -37.55)
SoP	Non-Reporting	29	23.82	0.66		
	Reporting	243	58.07	1.43		
	diff		-34.25***	4.14	-8.28 (270)	(-42.40, -26.11)
GvP	Non-Reporting	29	22.37	2.09		
	Reporting	243	49.87	1.39		
	diff		-27.49***	4.08	-6.74 (270)	(-35.52, -19.47)

*** denote 1% significance

5.3.4 Differences in ESG scores by Reporting Status - Europe

Table 31 and Table 32 shows the result for Europe. From the table the mean difference in ESG score EnPS, SoPS, and GvPS are 38.30, 36.38, 42.71, and 33.37 respectively, and all in favour of reporting O&G companies. At the corresponding statistics [t = -8.34, 95% C.I (-47.34, -29.27)], [t = -7.31, 95% C.I (-46.19, -25.79)], [t = -8.24, 95% C.I (-52.91, -31.51)], and [t = -6.11, 95% C.I (-43.98, -22.55)], the differences are shown to be significant at 1% (denoted by the 3 asterisk). Hence, we reject the null hypothesis and conclude the reporting and non-reporting O&G companies in Europe differ in their sustainability performance, confirming the signaling hypothesis because the firms that report dominate in their sustainability performance.

Table 31: Test for Mean Differences in ESG Score – Europe

Group	Obs.	Mean	Std. Err.	t (df)	[95% C.I]
Non-Reporting	23	19.65	3.48		
Reporting	265	57.95	1.31		
combined	288	54.90	1.38		
diff		-38.30***	4.59	-8.34 (286)	(-47.34, -29.27)

*** denote 1% significance

Table 32: Test for Mean Differences in EnP, SoP, GvP scores – Europe

Var.	Group	Obs.	Mean	Std. Err.	t (df)	[95% C.I]
EnP	Non-Reporting	23	19.12	4.28		
	Reporting	265	55.51	1.42		
	diff		-36.38***	4.98	-7.31 (286)	(-46.19, -26.79)
SoP	Non-Reporting	23	18.18	3.28		
	Reporting	265	60.89	1.50		
	diff		-42.71***	5.18	-8.24 (286)	(-52.91, -31.51)
GvP	Non-Reporting	23	23.05	3.21		
	Reporting	265	56.31	1.58		
	diff		-33.27***	5.44	-6.11 (286)	(-43.98, -22.55)

*** denote 1% significance

5.3.5 Differences in ESG scores by Reporting Status - Oceania

Following the same hypothesis, Table 33 show that for O&G companies headquartered in Oceania, those that report perform better than those that do not report on their social and environmental impacts. At a t-statistic of -10.66 at 118 degrees of freedom and a 95% C.I (-31.17, -21.40), the difference in mean scores is confirmed to be statistically significant at 1%. Similarly, Table 34 show that O&G companies in Oceania that publish their sustainability reports performs better than their non-reporting comparators in all ESG components. The signaling theory is also supported by the Oceanian data for the O&G companies.

Table 33: Test for Mean Differences in ESG Score – Oceania Panel

Group	Obs.	Mean	Std. Err.	t (df)	[95% C.I]
Non-Reporting	70	17.73	0.72		
Reporting	50	44.02	2.74		
combined	120	28.68	1.70		
diff		-26.29***	2.47	-10.66 (118)	(-31.17, -21.40)

*** denote 1% significance

Table 34: Test for Mean Differences in EnP, SoP, GvP scores – Oceania

Var.	Group	Obs.	Mean	Std. Err.	t (df)	[95% C.I]
EnPS	Non-Reporting	70	5.10	0.73		
	Reporting	50	34.88	2.87		
	diff		-29.78***	2.57	-11.58 (118)	(-34.88, -24.16)
SoPS	Non-Reporting	70	15.91	1.00		
	Reporting	50	41.56	3.25		
	diff		-25.65***	2.98	-8.60 (118)	(-31.56, -19.74)
GvPS	Non-Reporting	70	39.49	1.84		
	Reporting	50	61.79	3.10		
	diff		-22.30***	3.41	-6.55 (118)	(-29.04, -15.56)

*** denote 1% significance

5.4 Discussion of Results

The study findings present a compelling narrative on the positive correlation between sustainability reporting and improved sustainability outcomes within the Oil and Gas (O&G) sector. Notably, O&G companies that engage in reporting on their sustainability performance demonstrate superior results in ESG scores and the individual component scores of the environmental, social, and governance pillars.

The global panel results underscore the significance of sustainability reporting, revealing a substantial mean ESG score difference of 32.04 between reporting and non-reporting O&G companies. At a 1% level of significance, the environmental, social, and governance pillar scores also exhibit noteworthy variances, standing at 33.01, 37.15, and 19.59, respectively.

This observed trend aligns with the signaling perspective to sustainability reporting, emphasizing that companies actively reporting on their sustainability efforts tend to outperform their non-reporting counterparts on a global scale. The findings echo earlier studies, including Uyar et al. (2020), Hummel et al. (2019), and Mahoney et al. (2013), supporting the argument that companies excelling in non-financial aspects are inclined to report on their social and environmental outcomes to uphold corporate sustainability and contribute to the broader global sustainability agenda.

These results provide valuable insights for O&G companies, emphasizing the strategic importance of sustainability reporting in achieving enhanced sustainability performance and fostering a positive impact on ESG outcomes. The study encourages further exploration into the mechanisms through which sustainability reporting influences and drives positive environmental, social, and governance practices within the O&G industry.

The empirical results for America, Asia, Europe, and Oceania show similar trend. Significant differences in ESG Scores, EnP, SoP, and GvP are shown for all regions by their status of sustainability reporting. The differences in mean scores are highly significant and in favour of sustainability reporting companies. Detail analysis show that amongst the regions, Europe

exhibits the most differences between the two groups (reporting and non-reporting companies) for the ESG score, SoP and GvP (38.30, 42.71, and 33.27) while the results for the Asia show the largest difference in EnPS (45.51). Also, the differences in GvPS between the two groups for O&G companies in the Americas (32.83), Asia (27.49), Europe (33.27) and Oceania (22.30) surpassed the global average (19.59).

The results for the Americas support the findings of Wang et al. (2018) for America, and Hummel at al. (2019) for Europe. In general, the study confirms the signaling perspective of sustainability reporting and sustainability performance for reporting and non-reporting companies. Following the proposed hypothesis and based on our study results, we make the following conclusions for the global panel and regional panels:

For the global panel, we reject the null hypothesis of equal means for ESG and its component scores. We conclude that:

- *There is a significant difference in average ESG scores between sustainability-reporting and non-reporting O&G companies – in favour of reporting O&G companies.*
- *There is a significant difference in average EnPS, SoPS, and GvPS in favour of O&G companies that report on their sustainability*

For the O&G companies in the Americas, we reject the null hypothesis of equal means for ESG and its component scores. We conclude that:

- *There is a significant difference in average ESG scores between sustainability-reporting O&G companies and non-reporting companies in the Americas – in favour of the reporting companies.*
- *There is a significant difference in average EnPS, SoPS, and GvPS in favour of Asian O&G companies that report on their sustainability*

For the O&G companies in Asia, we reject the null hypothesis of equal means for ESG and its component scores. We conclude that:

- *There is a significant difference in average ESG scores between sustainability-reporting O&G companies and non-reporting companies in Asia – in favour of the reporting companies.*
- *There is a significant difference in average EnPS, SoPS, and GvPS in favour of Asian O&G companies that report on their sustainability*

For the O&G companies in Europe, we reject the null hypothesis of equal means for ESG and its component scores. We conclude that:

- *There is a significant difference in average ESG scores between sustainability-reporting O&G companies and non-reporting companies in Europe – in favour of the reporting companies.*
- *There is a significant difference in average EnPS, SoPS, and GvPS in favour of European O&G companies that report on their sustainability*

For the O&G companies in Oceania, we reject the null hypothesis of equal means for ESG and its component scores. We therefore conclude that:

- *There is a significant difference in average ESG scores between sustainability-reporting O&G companies and non-reporting companies in Oceania – in favour of the reporting companies.*
- *There is a significant difference in average EnPS, SoPS, and GvPS in favour of O&G companies in Oceania that report on their sustainability*

The next chapter addressing the question of the likelihood of reporting for the O&G companies globally and for the four regions. He we will be able to justify the relationship between magnitude and directional relationship between sustainability performance and likelihood of reporting for O&G firms in general and across the regions.

Chapter Six

Results and Discussion: Determinants of Sustainability Reporting

6.1 Introduction

The previous chapter established significant differences in sustainability performance, measured by the ESG score and its component score for sustainability-reporting and non-reporting O&G companies for the global panel and the four regions under study– the Americas, Asia, Europe, and Oceania. As a detailed analysis from the previous chapter, this chapter examines the determinants of sustainability reporting for the global and individual regional panels using selected variables informed by theory and empirical literature. Separate results are presented and discussed for the global panel and 4 regional panels on the relationship between sustainability reporting and the regression predictors; most importantly the effect of sustainability performance on reporting. The analysis included the moderating role auditor quality on the relationship between sustainability performance and reporting.

6.2 Determinants of Sustainability Reporting

Table 35, Table 40, Table 43, Table 44, and Table 45 show the result for the panel probit regressions for the global panel, and separately for the four regions (Americas, Asia, Europe and Oceania) respectively. The results are presented for ten (10) models following the equation (2) and (3) specified in the methodology section. In models 1-6 (M1-M6), sustainability reporting is regressed on sustainability performance indicators and the moderating variable (auditor quality) separately. No control variables are included in these models. Models 7-8 include all control variables but without interaction. Model 9 and 10 are the full models, the former with components scores as indicators of sustainability performance, and the later, the composite score (ESG). This applies for both the global panel results and the regional results.

6.2.1 Probit Results for the Global Panel

The empirical results from the panel probit analysis for the global panel is displayed in Table 35. Models 1-3 show that the components indicators of sustainability performance (EnP, SoP, and GvP) are significantly positive. ESG is also reported to be significantly positive in M5. These predictors regressed separately on Sr indicate a low of 4% and a high of approximately 18% likelihood of positively influencing sustainability reporting at 1% level of significance ($p < 0.01$). In model 4 (regression of all 3 component scores), only SoP reported to be insignificant. The estimated coefficient for EnP and GvP are approximately 0.14 ($p < 0.01$) and 0.03 ($p < 0.01$) showing 14% and 3% high likelihood of reporting. In model 5 and 6, both ESG and AuQ are significant with predicted coefficient of 0.177 and (4.854 and 2.442).

In models 7 and 8 (the full model without the interactions), the estimated coefficients of EnP GvP, and ESG are 0.16, and 0.03 respectively. These corresponds to average marginal effects of 0.00721, and 0.001143 (see appendix), indicating that, based on mean-centered values, a 1% increase in environmental and governance performance increases the likelihood of reporting

on sustainability by 0.78% and 0.11% for a globally-average O&G company. Similar result is found for ESG where significant estimated coefficient of 0.163 is associated with an average marginal effect of 0.0075 indicating that a 1% increase in sustainability performance measured by ESG score increases the probability of reporting by approximately 0.75%.

In M8 and M9 where the interaction term (*ESG # AuQ*) and [(*EnP SoP GvP) # AuQ*] is included (full model with interactions), all the performance indicator are found to be significant except for GvP, as is the case without the interactions. In both models, M8 and M9, the estimated coefficient of the sustainability performance indicators represents the effect of the respective performance indicators on reporting for companies that do not engage external auditors (i.e., the effect of SP when AuQ = 0). The results generally indicate that environmental performance and overall performance (ESG scores) increases the likelihood of reporting by O&G firm, all things being equal. In addition, the model without interaction indicates a positive direct effect of auditor quality on the likelihood of sustainability reporting. Thus, model 6-9 reports a positive direct effect of audit consulting on sustainability reporting. Relative to companies with no external auditor, audit consulting increases the likelihood of reporting for both 'other' and Top4 in M6 and only 'other' in models 7 and 8.

Models 9 and 10 which includes interaction term (*sustainability performance indicator x AuQ*) is used in addressing hypothesis 11, 12 13 and 14 (H_{11}, H_{12}, $H_{13,}$ and H_{14} respectively) In model 9, we found significant predicted coefficient of the interaction of Top4 with EnP (-0.149), SoP (0.082), GvP (0.117), and ESG (0.253). This suggests that auditing by Top4 reduces the likelihood of the positive effect of EnP on reporting, mitigate the negative effect of SoP on the predicted probability of reporting, and reenforces the significant positive effect on the relationship between GvP and reporting. Importantly, auditor consulting by Top4 is shown in model 10 to reinforce the positive effect of ESG performance on sustainability reporting. Separate predicted margins were computed for all three level of AuQ (none, other and Top4) at the minimum[7], mean, and maximum[8] values of sustainability performance (EnP, SoP, GvP, and ESG) as indicated Table 36 to Table 39.

The margin column in Table 36 indicate that at low levels (minimum score) of environmental performance (EnP), companies audited by Top4 have higher probability of reporting (60.1%) relative to does audited by 'other' external auditors (52.6%) and those that do not consult external auditors (37.6%). At the mean and maximum EnP, companies that do not have external auditor show high probability of reporting (82.2% and 98.7% respectively) relative to 77.5% and 96.6% for companies that use other non-Top4, and 66.9% and 73.4% for those audited by Top4. This result is similar to SoP, GvP and ESG with few variations as indicated in the Table 37, Table 38, and Table 39 with a summary in Figure 11. But the slope of Top4 is for the most part steadier and flatter than the slope for 'other'.

[7] Minimum in this context refers to 1 standard deviation (1std dev.) below the mean, calculated as the mean less the standard deviation of the respective variable.
[8] Maximum as applied here means 1 std dev above the mean. It is calculated as the statistical mean plus the standard deviation of the variable.

Figure 11 show the margins plot for the significant interactions. It shows the predicted margins of the relationship between sustainability performance and sustainability reporting based on the moderating effect of AuQ. The horizontal axis shows the selected values of sustainability performance (minimum, mean, and maximum) and the vertical axis represents the predicted probability of reporting (Sr). This result has two implications. First, it confirms a positive performance-reporting nexus, and support for the respective hypothesis. Second, at very low level of sustainability performance, companies audited by Top4 have high likelihood of reporting than those audited by other external auditors.

The predictive margins for ESG (in the first quadrant show that on average, having external auditor promotes sustainability reporting even at lower levels of ESG (combined effect of other and Top4). However, at higher levels of performance, companies with no external auditor have higher probability of reporting relative to those that consult external auditors, either Top4 or non-Top4. Similar to the results for ESG, that for EnP show a flatter slope for Top4 across the EnP ranges, albeit high probability at lower EnP relative to 'none' and 'other'. In the third quadrant where the predictive margins for SoP is presented, Top4 continue to have an increasing but moderate effect on the positive relationship between SoP and Sr. While the line for Top4 and 'other' show a positive slope, but the latter being steeper, 'none' produces a negative slope. In the GvP graph (4^{th} quadrant), the line for Top4 is steeper while 'none' and 'other' show a-near flat line.

Other findings are worth mentioning. Board size is positive and significant, implying that a typical company with larger board size have high likelihood of reporting based on the selected values of ESG in model 7 and 9. Further, companies that adopt the GRI guidelines have high likelihood of reporting in all the models. Similar, positive results is found for LEV.

Table 35: Probit Results for O&G Companies - The Global Panel

Variable	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
EnP	0.172***			0.137***			0.166***		0.197***	
SoP		0.112***		0.022			-0.008		-0.034*	
GvP			0.044***	0.030***			0.029**		0.016	
ESG					0.177***			0.150***		0.121***
AuQ (base=none):										
other						4.854**	1.791*	1.809**	-11.207***	-8.160***
Top4						2.442*	-1.437	-1.234	-4.715*	-2.988*
EnP # other									0.055	
EnP # top4									-0.149***	
SoP # other									0.298***	
SoP # top4									0.082**	
GvP # other									0.034	
GvP # top4									0.117***	
ESG # other										0.253***
ESG # top4										0.050
COM (base=none):										
only_1							0.150	-0.764	-0.523	-1.051
two_comm							2.263	0.751	1.828	0.945
all_3							2.992	1.171	2.947	1.531
Bsz							0.213*	0.153	0.210*	0.117
BGd							-0.031	-0.016	-0.045*	-0.030
BI							-0.027	-0.020	-0.028	-0.022
CEOBm (base=no) yes:							-0.392	-0.023	-0.385	-0.007

*The robust standard errors are not reported here due to reporting space; *** p<0.01, ** p<0.05, * p<0.1*

Continuation from Table 35

Variable	M1	M2	M3	M4	M5	M6	M7	8	M9	M10
EPS							-0.239	-0.078	-0.219	-0.143
GRI (base=no): yes							1.660*	1.797**	2.370**	2.331**
SZ									-0.142	0.195
Age									0.034*	0.018
LEV									0.084***	0.060***
ROE									-0.025	-0.010
Region (base=Americas):										
Asia	2.44**	3.039***	5.193***	2.785***	3.008***	4.772***	3.491*	3.164**	3.768*	3.491*
Europe	2.18*	3.261***	5.478***	2.692**	3.230***	5.454	4.905*	4.569***	5.640**	5.208***
Oceania	1.27**	0.398	-0.325	1.377**	1.101**	-0.155	3.785***	2.720***	3.095**	2.943***
Industry (base= E&P):										
O&G Integrated	-0.97	-0.000	1.106	-0.738	-0.285	0.699	-1.005	-0.229	-1.632	-0.838
O&G R&M	1.76	2.493*	5.191***	1.887	2.210*	5.205**	-	-	-	-
Constant	-4.56***	-4.206***	-3.259**	-5.934***	-6.424***	-1.994	-8.886***	-7.620***	-5.565	-11.112**
Observations	1,288	1,288	1,288	1,288	1,288	1,288	1,076	1,076	1,076	1,076
Number of Comp	161	161	161	161	161	161	136	136	136	136
firm Controls	no	no	no	no	no	no	no	no	yes	yes
year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
region dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
industry dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Rho	0.84	0.85	0.93	0.81	0.78	0.95	0.89	0.85	0.89	0.87
log likelihood	-185.51	-224.59	-252.72	-178.92	-188.88	-248.39	-151.16	-162.12	-138.75	-155.22
chi2	59.46	54.71	80.98	77.49	68.91	e(chi2)	72.77	96.98	194.66	106.37
p>chi2	0.00	0.00	0.00	0.00	0.00	e(p)	0.00	0.00	0.00	0.00

*The robust standard errors are not reported here due to reporting space; *** p<0.01, ** p<0.05, * p<0.1*

Table 36: Predictive margins of AuQ at different values of EnP – Global Panel

	Margin	Std. Err.	z	[95% Conf. Interval]	
_at#AuQ:					
1#none	0.376***	0.073	5.14	0.232	0.519
1#other	0.526***	0.071	7.41	0.387	0.665
1#Top_4	0.601***	0.075	8.01	0.454	0.748
2#none	0.822***	0.045	18.3	0.734	0.911
2#other	0.775***	0.057	13.66	0.663	0.886
2#Top_4	0.669***	0.055	12.09	0.561	0.778
3#None	0.987***	0.013	73.44	0.961	1.014
3#Other	0.966***	0.055	17.5	0.858	1.074
3#Top_4	0.734***	0.087	8.42	0.564	0.905

*** p<0.01; *1._at = 10.34 (minimum EnP); 2._at = 38.12 (mean EnP); 3._at = 65.90 (maximum EnP)*

Table 37: Predictive margins of AuQ at different values of SoP – Global Panel

	Margin	Std. Err.	z	[95% Conf. Interval]	
_at#AQQ					
1#none	0.651***	0.019	33.82	0.613	0.689
1#other	0.549***	0.043	12.9	0.465	0.632
1#Top_4	0.605***	0.065	9.27	0.477	0.733
2#none	0.616***	0.021	30.02	0.576	0.656
2#other	0.761***	0.074	10.23	0.615	0.907
2#Top_4	0.669***	0.062	10.86	0.548	0.790
3#none	0.581***	0.034	17.23	0.515	0.647
3#other	0.958***	0.063	15.27	0.835	1.081
3#Top_4	0.730***	0.100	7.31	0.534	0.925

*** p<0.01; *1._at = 17.29 (minimum SoP); 2._at = 43.68 (mean SoP); 3._at = 70.06 (maximum SoP)*

Table 38: Predictive margins of AuQ at different values of GvP – Global Panel

	Margin	Std. Err.	z	[95% Conf. Interval]	
_at#AQQ					
1#none	0.621***	0.024	25.64	0.574	0.669
1#other	0.599***	0.020	30.61	0.560	0.637
1#Top_4	0.478***	0.067	7.19	0.348	0.609
2#none	0.639***	0.020	32.05	0.600	0.678
2#other	0.623***	0.032	19.54	0.560	0.685
2#Top_4	0.666***	0.071	9.35	0.526	0.806
3#none	0.657***	0.026	25.02	0.605	0.708
3#other	0.648***	0.053	12.17	0.544	0.752
3#Top_4	0.833***	0.087	9.57	0.663	1.004

*** p<0.01; *1._at = 28.42 (minimum GvP); 2._at = 52.39 (mean GvP); 3._at = 76.37 (maximum GvP)*

Table 39: Predictive margins of AuQ at different values of ESG – Global Panel

	Margin	Std. Err.	z	[95% Conf. Interval]	
_at#AQQ					
1#none	0.498***	0.060	8.25	0.380	0.616
1#other	0.261***	0.109	2.4	0.048	0.474
1#Top_4	0.332***	0.083	3.99	0.169	0.496
2#none	0.735***	0.045	16.18	0.646	0.823
2#other	0.909***	0.047	19.2	0.816	1.002
2#Top_4	0.669***	0.099	6.78	0.476	0.862
3#none	0.903***	0.065	13.79	0.775	1.032
3#other	1.000***	0.000	3637.28	0.999	1.000
3#Top_4	0.917***	0.094	9.8	0.733	1.100

*** p<0.01; *1._at = 20.82 (minimum ESG); 2._at = 43.81 (mean ESG); 3._at = 66.80 (maximum ESG)*

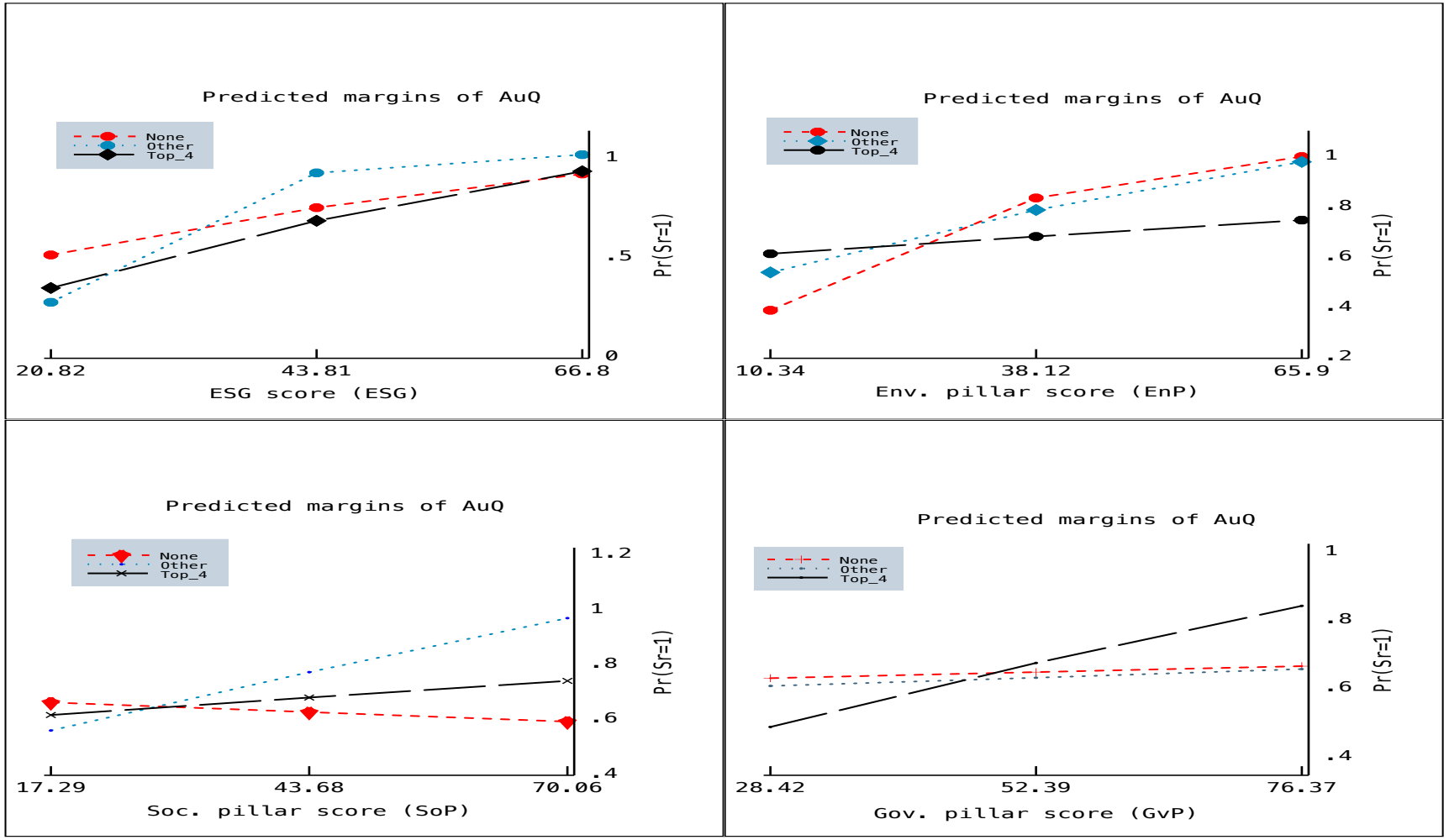


Figure 11: Predictive margins plot of significant interaction effect on Sr – The Global Panel

6.2.2 Probit Results for O&G Companies in the Americas

Table 40 show the probit results for O&G companies in the Americas. The sustainability performance indicators are all found to be statistically significant in the separate models, and are correctly signed. EnP, SoP, GvP, and ESG indicate a statistically positive direct effect on sustainability reporting in M1-M3 and M5. In M4 which includes all three component scores, SoP was not significant. Auditing by other auditing firms (other) is shown to be significant with predicted coefficient of 6.434 in M6 while Top4 was omitted in all the models (M6-M10).

In the full model without predictors (M7 and M8), the estimated coefficient of EnP, GvP and ESG are 0.15 ($p<0.01$), 0.02 ($p<0.1$), and 0.14 ($p<0.01$) respectively. This corresponds to a marginal effect of 0.0097, 0.0014, and 0.0105 indicating that without the interactions, a unit increase in the respective performance scores increases the probability of reporting by 0.97%, 0.14%, and 1.05%. The audit quality variable was not significant in M7 and M8. The probit result for M9 and M10 show no significant difference from the results from M7 and M8 for the sustainability performance indicators. Nonetheless, the result shows a significant marginal effect of approximately 0.0105, 0.0017, and 0.1518 for EnP, GvP, and ESG. This indicate companies with high EnP, SoP, and ESG are 1.05%, 0.17, and 15.18% respectively more likelihood of reporting on their sustainability impacts.

In M9 and M10, only two interactions were found to be significant with estimated coefficients of 0.21 ($p<0.05$) and 0.13 ($p<0.01$) for the interactions (SoP # other) and (ESG # other) respectively. Hence, we computed the predictive margins, and the margins plots for these two interactions. This shown in Table 41 and Table 42, and graphically illustrated in Figure 12.

In Table 41, auditing by 'other non-Top4' firms are associated with less (approximately 27.8% more) probability of reporting at the minimum SoP as against 49.5% for companies that do not consult external auditors. As SoP increases (from mean to maximum value), auditing by 'other non-Top4' firm is associated higher margins of 0.629 and 0.957 corresponding to 62.9 and 95.7% high likelihood of reporting. This compares to a lower margin of 0.481 and 0.466 respectively. In Table 41, the relative role of auditor quality on sustainability performance in ESG score and sustainability reporting is similar. That is, relative to 'none', 'other' is associated with lower predictive margin of 0.009 compared to 0.074 for 'none' at the lower ESG (minimum ESG value of 16.74 as shown in Figure 12. At mean ESG, 'other' is associated with 0.756 predictive margin as compared to 0.585 for 'none'. This indicates that relative to 'none', companies auditing by 'other' auditing firms are 75.6% more likely to report as EGS increase towards the mean. The associated predicted margins at the maximum ESG values show even increasing likelihood of reporting for O&G companies in the Americas that are audited by 'other' non-Top4 external auditors showing a probability of 100% (certainty) as compared to 97.4% probability of reporting for those without external auditors (none). This is shown evident in Figure 12. Both lines show positive and increasing slope as ESG increase, the slope of 'other' (blue line) being steeper than that of 'none' (the red line).

Table 40: Probit Results for O&G Companies in the Americas

Variable	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
EnP	0.16***			0.15***			0.15***		0.16***	
SoP		0.10***		0.01			-0.01		-0.01	
GvP			0.04***	0.03***			0.02*		0.02*	
ESG					0.17***			0.14***		0.15***
AuQ (base=none):										
other						6.43***	0.83	0.82	-6.18***	-3.91**
Top4						-	-	-	-	-
EnP # other									-0.03	
EnP # top4									-	
SoP # other									0.21***	
SoP # top4									-	
GvP # other									0.02	
GvP # top4									-	
ESG # other										0.13***
ESG # top4										-
COM (base=none):										
only_1							-1.716***	-2.04***		
two_comm							-0.82	-0.95		
all_3							-0.68	-1.22		
Bsz							0.11	0.07		
BGd							-0.02	-0.01		

*The robust standard errors are not reported here due to reporting space; *** p<0.01, ** p<0.05, * p<0.1*

Continuation from Table 40

Variable	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
BI							-0.02	-0.02		
CEOBm (base=no) yes:							-2.03***	-1.36***		
EPS							-0.55	-0.36		
GRI (base=no): yes							0.99	1.20		
SZ							0.09	0.21		
Age							0.02	0.01		
LEV							-0.01	0.01		
ROe							0.01	0.03		
Industry (base= E&P):										
O&G Integrated	-0.69	-0.26	1.07	-0.47	-0.25		-1.48*	-	-0.63	-0.32
O&G R&M	0.11	0.13	3.91**	0.46	0.36		-	-0.73	0.59	0.51
Constant	-4.44***	-3.80***	-3.20	-5.63***	-5.98***	-2.42	-4.44	-7.38**	-5.30***	-5.68***
Observations	608	608	608	608	608	581	564	564	581	581
Number of Comp	76	76	76	76	76	75	72	72	75	75
Firm Controls	no	no	no	no	no	no	no	no	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Ind dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
rho	0.72	0.77	0.94	0.66	0.61	0.96	0.67	0.63	0.71	0.64
log likelihood	-109.18	-149.97	-168.05	-104.17	-116.42	-158.42	-92.83	-105.60	-99.21	-112.83
chi2	51.13	44.74	38.01	86.33	57.00	389.81	150.49	128.76	87.76	78.77
p>chi2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

*The robust standard errors are not reported here due to reporting space; *** p<0.01, ** p<0.05, * p<0.1*

Table 41: Predictive margins of AuQ at different values of SoP – Americas

	Margin	Std. Err.	z	[95% Conf.	Interval]
_at#AuQ:					
1#none	0.495***	0.036	13.85	0.425	0.565
1#other	0.278***	0.095	2.92	0.091	0.465
2#none	0.481***	0.022	21.52	0.437	0.525
2#other	0.629***	0.078	8.04	0.476	0.782
3#none	0.466***	0.046	10.23	0.377	0.556
3#other	0.957***	0.071	13.51	0.818	1.096

*** p<0.01; *1._at = 12.20 (minimum ESG); 2._at = 35.70 (mean ESG); 3._at = 59.21 (maximum SoP)*

Table 42: Predictive margins of AuQ at different values of ESG – Americas

	Margin	Std. Err.	z	[95% Conf.	Interval]
_at#AuQ:					
1#none	0.074**	0.030	2.46	0.015	0.132
1#other	0.009	0.014	0.62	-0.018	0.036
2#none	0.585***	0.059	9.97	0.470	0.700
2#other	0.756***	0.096	7.84	0.567	0.945
3#none	0.974***	0.022	44.1	0.931	1.017
3#other	1.000***	0.000	9759.79	1.000	1.000

*** p<0.01; *1._at = 16.74 (minimum ESG); 2._at = 37.69 (mean ESG); 3._at = 58.63 (maximum ESG)*

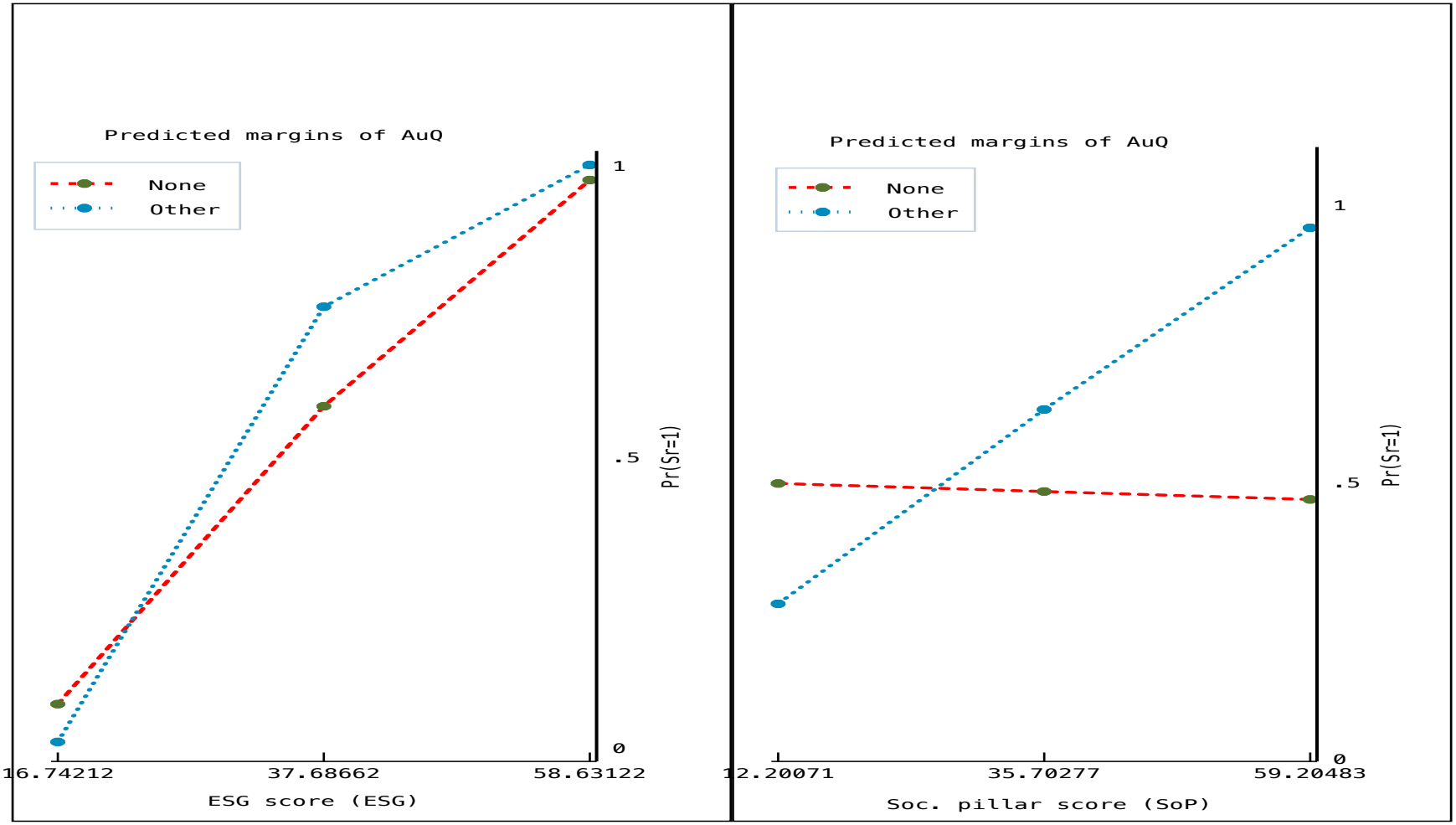


Figure 12: Predictive margins plot of significant interaction effect on Sr – The Americas

6.2.3 Probit Results for O&G Companies in the Asia

In Table 43, M1-M3 show that in EnP, SoP, and GvP as separate predictors do not influence sustainability reporting for O&G companies in Asia. Similar to the results for America, the estimated coefficient reported in M4 and M5 indicate that EnP, GvP and ESG are positive significant predictors Sr. This directional effect and significance of the performance variables are confirmed in the full models, both without and with interactions. In M7 and M8, statistically significant predicted coefficients of 0.767, 0.301, and 0.820 for EnP, GvP, and ESG corresponds to 0.06%, 0.02%, and 0.07% high probability of reporting. Similarly, in M9 and M10 (full models with interaction), the significant estimated coefficient for EnP (0.197), GvP (0.089), and ESG (0.385) corresponds to a predicted marginal effect of 0.05%, 0.02, and 0.07% respectively. The reported coefficients for SoP, and AuQ (for all categories) are not significant in all the models.

The interaction terms (sustainability performance indicators and external auditor type) are all not significant. This means that auditor quality does not influence the relationship between sustainability performance and sustainability reporting. Governance attributes such as board size and board independence were controls for in M10, likewise the adoption and use of GRI guidelines. Bsz and BI had significant estimated coefficients of 1.077 and 0.174 respectively at the 1% level of significance.

Table 43: Probit Results for O&G Companies - Asia

Variable	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
EnP	0.671			0.543**			0.767***		0.197**	
SoP		0.327		-0.046			-0.074		-0.067	
GvP			0.326	0.372**			0.301**		0.089*	
ESG					0.732***			0.820***		0.385**
AuQ (base=none):										
other						1.739	-6.341	-2.043	-146.562	-65.109
Top4						0.184	-1.988	-2.356	-691.064	8.086
EnP # other									2.07	
EnP # top4									-4.32	
SoP # other									-0.079	
SoP # top4									8.325	
GvP # other									2.723	
GvP # top4									22.182	
ESG # other										0.443
ESG # top4										-0.366
Bsz								0.551		1.077***
BGd							0.036	0.101		
BI							0.384***	0.111		0.174***

*The robust standard errors are not reported here due to reporting space; *** p<0.01, ** p<0.05, * p<0.1*

Continuation fromTable 43

Variable	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
EPS							7.409***	1.515		
GRIG (base=no): yes										52.654
Industry (base= E&P):										
O&G Integrated	-	-	-	-	-	-		-		
O&G R&M	2.757	4.12	7.396	6.448	2.319	7.133***		4.858		
Constant	-12.784	-2.937	-5.941	-25.931**	-19.997***	2.826*	-34.223***	-30.280***	-3.342	-21.791***
Observations	256	256	256	256	256	256	272	256	272	272
Number of Comp	32	32	32	32	32	32	34	32	34	34
Firm Controls	No	No	No	No	No	No	Yes	Yes	No	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	NO
Ind dummies	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No
rho	0.99	0.99	0.99	0.98	0.98	0.99	0.98	0.99	0.71	0.99
log likelihood	-12.12	-16.06	-15.8	-9.41	-11.33	-18.94	-11.55	-10.93	-11.52	-14
chi2	2837.99	5391.3	33245.7	10.07	25.35	20.63	22.07	23.87	26.72	28.53
p>chi2	0.00	0.00	0.00	0.52	0.00	0.02	0.00	0.07	0.00	0.00

*The robust standard errors are not reported here due to reporting space; *** p<0.01, ** p<0.05, * p<0.1*

6.2.4 Probit Results for O&G Companies in Europe

In Table 44, the composite indicator for sustainability performance, the ESG score, is reported to significantly have positive influence on sustainability reporting for the models without interactions where it featured. In M5 and M8, thus, the simple and full model respectively, the estimated coefficient for ESG is 0.34 and 0.72. This implies a positive significant effect of ESG performance on sustainability reporting for O&G companies in Europe. Similarly, the component scores and indicators of sustainability performance show significant positive effect on sustainability reporting with respective statistics of ($\beta = 0.27$; $p < 0.01$), ($\beta = 0.38$; $p < 0.01$), and ($\beta = 0.23$; $p < 0.05$) for EnP, SoP, and GvP in model 1, model 2, and model 3 respectively. In model 4 (M4) where Sr is regressed on all and only the component scores, both EnP, and GvP were significant predictors of sustainability reporting. SoP with estimated coefficient of 0.33 was significant at 5%. However, in M7 (full model without interaction), both EnP and SoP are reported to significantly influence Sr by O&G companies in Europe on average. Relative to companies that do not consult external auditors, auditing by Top4 is found to have significant positive estimated coefficient of 6.69 in M6, -19.44 in M7 and -12.75 n M8.

Alternatively, auditing by Top4 relative to no external auditor is associated with less probability of reporting on sustainability impacts. This is the case for M7 and M8 – the full model without interactions. In M9 and M10 (full model with interaction) only EnP was shown to significantly influence Sr with an estimated coefficient of 0.27 in M9. The associated p-value (< 0.5) implies that O&G companies in Europe that performs well on the environmental bottom line are more likely to report on sustainability. Following from the margins results which reports the marginal effects of the predictor variables on Sr, there is a corresponding 0.1645 marginal effect. This indicate that a unit increase in the environmental score of an average O&G company in Europe increases the probability of reporting by approximately 16.95% and at 5% level of significance.

Interestingly in M10 where we controlled for corporate board size, board gender diversity, board independence, and GRI, with further considerations for the year fixed and industry fixed effects, none of the variables were reported to be significant. More so, since the interactions in both M9 and M10 were found to be insignificant, the predictive margins and further investigations on the role of auditor quality on the performance-reporting relationship was ignored.

Table 44: Probit Results for O&G Companies - Europe

Variables	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
EnP	0.27***			0.12			0.28***		0.27**	
SoP		0.38***		0.33**			0.45***		0.34	
GvP			0.23**	0.10			0.10		0.11	
ESG					0.34***			0.72***		0.93
AuQ (base=none):										
other						-	-	-	-	-
Top4						6.69***	-19.44***	-12.75**	-14.04	4.12
EnP # other									0.00	
EnP # Top4									-0.03	
SoP # other									0.00	
SoP # Top4									0.05	
GvP # other									0.00	
GvP # Top4									-0.03	
ESG # other										0.00
ESG # Top4										-0.31

*The robust standard errors are not reported here due to reporting space; *** p<0.01, ** p<0.05, * p<0.1*

Continuation from Table 44

Variables	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
Bsz										0.41
BGd										0.01
BI										0.13
GRI (base=no): yes										-18.89
Industry (O&G E&P):										
O&G Integrated		-	-	-	-	-				
O&G R&M		-7.36**	-0.12	-7.32	-6.82**	-1.29				
Constant	-0.50	2.36	8.32**	-0.92	0.37	9.11***	-6.51**	-4.88*	-3.09	-10.49
Observations	288	200	200	200	200	155	219	219	219	219
Number of Comp	36	25	25	25	25	21	31	31	31	31
Firm Controls	no	no	no	no	no	no	no	no	no	yes
Year dummies	yes	yes	yes	yes	yes	yes	no	no	yes	yes
Ind dummies	no	yes	yes	yes	yes	yes	no	no	yes	yes
rho	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
log likelihood	-14.53	-12.09	-14.48	-11.33	-12.53	-14.50	-17.22	-17.67	-17.50	-15.26
chi2	13.71	19.12	15.19	34.09	22.30	17.52	22.14	22.84	24.85	32.54
p>chi2	0.09	0.02	0.09	0.00	0.01	0.04	0.00	0.00	0.00	0.00

*The robust standard errors are not reported here due to reporting space; *** p<0.01, ** p<0.05, * p<0.1*

6.2.5 Probit Results for O&G Companies in Oceania

The probit result for O&G companies in Oceania is presented in Table 45. Statistically significant coefficients were reported for EnP ($\beta = 0.17$; $p < 0.01$), SoP ($\beta = 0.23$; $p < 0.05$), and GvP ($\beta = 0.06$; $p < 0.05$) in M1, M2, and M3 respectively. In M3, only EnP was significant with a predicted coefficient of 0.12. The composite score (ESG) is shown to be highly significant with predicted coefficient of 0.18 as reported in M5. In M6-M7, AuQ was not significant. The positive influence of EnP and ESG on Sr is confirmed in M7 and M8 with respective coefficients of 0.12 and 0.17. These coefficients correspond to a marginal effect of 0.0195 and 0.0167 on Sr respectively. Based on mean centered values, O&G companies in Oceania are 1.95% more likely to report when EnP increase by a point-score, and 1.67% high of reporting with a score increase in ESG. This represents approximately 2% probability.

Similar results are shown for M9 and M10. This confirms the significance and positive effect of EnP and ESG on Sr for O&G companies in Oceania. The associated probit regression coefficients correspond to a marginal effect of 0.0105 and 0.01363 indicating approximately 1.05% and 1.36% high probability of reporting with an increase in EnP and ESG respectively all things being equal. In both full models (the with and without interaction models), the control variables were excluded, since including these variables makes the estimation of our model impossible. Hence, we omit the control variables in models 7, 8, 9, and 10.

The estimates in M9 and M10 reports significant interaction coefficients for two interaction terms. That is, the interaction between GvP and Top4; and between ESG and Top4. Hence, we probe the role of AuQ on the performance-reporting nexus for governance performance indicator and audit quality, and the composite performance score and audit quality. This is presented in Table 46 and Table 47. The interaction effect of AuQ is shown for the minimum, mean, and maximum values of GvP and ESG whose interactions with AuQ was significant.

Both tables show the margins for GvP#none, GvP#Top4, ESG#none, and ESG#Top4. The interactions of sustainability performance indicators and 'other' is dropped dues to limited observation (i.e., there were only 4 Comp-Year observations that consult 'other' external auditing firms in the Oceania sample). In Table 46, at lower levels of GvP, companies that are auditing by Top4 0.1% probability of reporting while those that have no external auditors have approximately 26% more probability of reporting on their sustainability impact. As GvP increases from the mean value to the maximum values, auditing by Top4 is reported to increase the probability of reporting relative to no external auditing (none) as the predicted margin increases from 0.272 to 0.983 for Top4, and from 0.347 to 0.437 for 'none'. For the later, this corresponds to 27.2% to 98.3% increase in the likelihood of reporting. Similar, trend holds for the interactions with ESG as auditing by Top4 show relatively higher increase in margin from 0.00 at minimum ESG value to 1.00 at maximum ESG value relative to a corresponding low of 0.065 and a high of 0.794 for 'none'. This means that at maximum GvP and ESG levels, it is almost certain (i.e., 98.3% and 100% probability respectively) that firm O&G companies audited by Top4 will report on their sustainability impacts. This is illustrated in Figure 13.

Table 45: Probit Results for O&G Companies - Oceania

Variables	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
EnP	0.17***			0.12**			0.12**		0.10*	
SoP		0.23**		0.02			0.02		0.01	
GvP			0.06**	0.03			0.03		0.03	
ESG					0.18***			0.17***		0.15***
AuQ (base=none):										
other						-	-	-	-	-
Top4						3.65	0.42	0.51	-26.88***	-29.79***
EnP # other									0.00	
EnP # Top4									0.02	
SoP # other									0.00	
SoP # Top4									0.06	
GvP # other									0.00	
GvP # Top4									0.50***	
ESG # other										0.00
ESG # Top4										1.22**

The robust standard errors are not reported here due to reporting space; *** *p<0.01,* ** *p<0.05,* * *p<0.1*

Continuation from Table 45

Variables	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
Industry (O&G E&P):										
O&G Integrated	-	-	-	-	-	-	-	-	-	-
O&G R&M	-0.66	2.35	1.74	-0.46	0.25	2.21	-0.49	0.18	-0.67	-0.25
Constant	-2.36**	-6.75*	-3.95**	-3.82**	-4.84**	-1.83	-3.71**	-4.77**	-3.36**	-4.25**
Observations	112	112	112	112	112	109	109	109	109	109
Number of Comp	14	14	14	14	14	14	14	14	14	14
Firm Controls	no	no	no	no	no	no	no	no	no	no
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Ind dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
rho	0.43	0.88	0.63	0.34	0.52	0.83	0.31	0.52	0.27	0.50
log likelihood	-25.30	-25.67	-30.66	-23.18	-23.75	-32.77	-23.10	-23.67	-21.88	-22.28
chi2	220.91	378.41	403.27	572.25	308.10	-	1082.82	308.93	510.32	6010.04
p>chi2	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00

The robust standard errors are not reported here due to reporting space; *** *p<0.01,* ** *p<0.05,* * *p<0.1*

Table 46: Predictive margins of AuQ at different values of GvP – Oceania

	Margin	Std. Err.	z	[95% Conf.	Interval]
_at#AuQ:					
1#None	0.260*	0.075	3.46	0.112	0.407
1#Top_4	0.001**	0.010	0.14	-0.018	0.021
2#None	0.347**	0.038	9.15	0.272	0.421
2#Top_4	0.272**	0.022	12.49	0.229	0.315
3#None	0.437*	0.076	5.75	0.288	0.586
3#Top_4	0.983**	0.037	26.39	0.910	1.056

*** p<0.01; *1._at = 27.40 (minimum ESG); 2._at = 48.78 (mean ESG); 3._at = 70.16 (maximum ESG)*

Table 47: Predictive margins of AuQ at different values of ESG – Oceania

	Margin	Std. Err.	z	[95% Conf.	Interval]
_at#AuQ:					
1#None	0.065**	0.046	1.4	-0.026	0.156
1#Top_4	0.000***	0.000	0.02	0.000	0.000
2#None	0.418	0.107	3.91	0.208	0.628
2#Top_4	0.871***	0.008	111.78	0.855	0.886
3#None	0.794	0.143	5.55	0.514	1.075
3#Top_4	1.000	-	-	-	-

*** p<0.01; *1._at = 10.11 (minimum ESG); 2._at = 28.68 (mean ESG); 3._at = 47.26 (maximum ESG)*

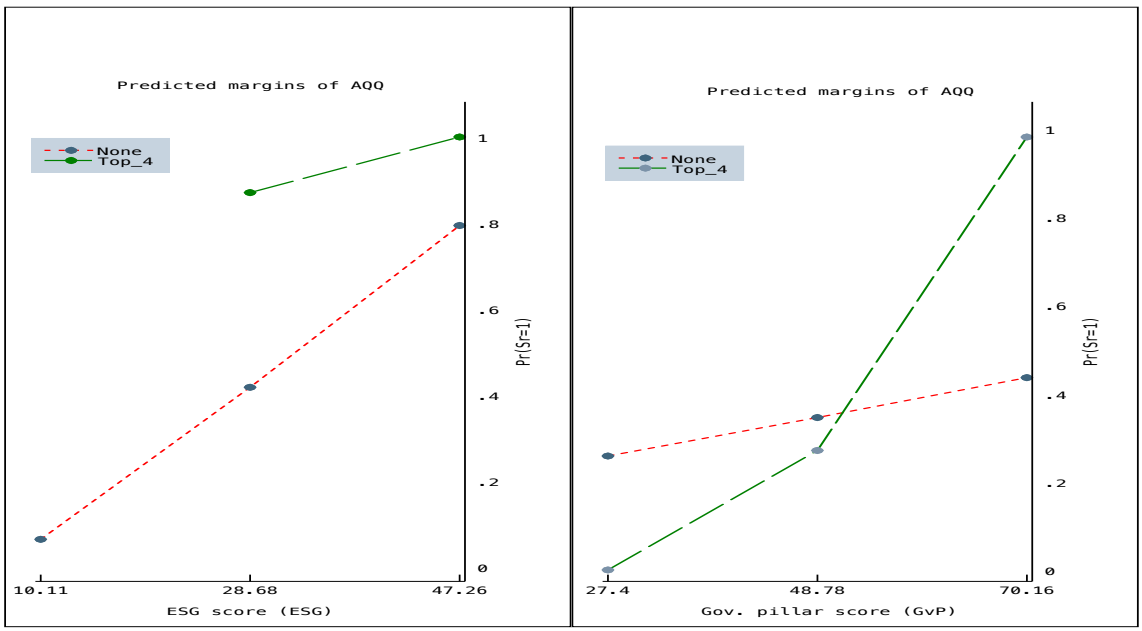


Figure 13: Predictive margins plot of significant interaction effect on Sr - Oceania Panel

6.3 Discussion of Results

The practice of sustainability reporting of social and environmental concerns has been linked to various internal and external factors. Following from the result presented in Table 35 through Table 47, the study shows results in support of theories of sustainability reports. The findings support for the signaling theory in terms of environmental performance for the global panel and all regional panels, and in relation to governance performance and general sustainability performance for the global panel and regional panels except for O&G companies in Europe. Focusing on the composite performance indicator (ESG scores) the study provides support for the signaling theory for O&G in general, and for O&G companies in the Americas, Asia, and Oceania. This is results provides support for the remarks by previous studies (Clarkson et al., 2019; Healy & Palepu, 2001) on the use of reporting to signal superior performance. This is similar to findings by Clarkson et al. (2019) and Orazalin & Mahmood (2018a).

This finding highlights the universal importance of ESG. The consistent positive influence of EnP, GvP and ESG on sustainability reporting across regions highlights the universal importance of these indicator. The same is true for SoP which is found to be significant predictor in all the simple models. This provides empirical support for the need for Managers to adopt integrated sustainability practices that consider environmental, social, and governance factors collectively. This holistic approach aligns with global expectations and enhances the likelihood of positive sustainability reporting outcomes.

Contrary to popular intuition of the agency theory, the number of board committee does not matter for reporting. More, country level environmental policies (that does not explicitly mandate reporting) has no influence on sustainability reporting. This re-emphasizes the power of voluntary reporting. This is core to ensuring green sustainability, with long term effect on limiting green washing behaviours by corporations. Given the positive influence of board attributes in Asia, organizations globally should focus on strengthening governance structures. Board size and independence positively correlate with sustainability reporting, highlighting the role of robust governance in driving sustainability practices.

The varying impact of auditors across regions underscores the need for organizations to consider regional nuances in their sustainability reporting strategies. Tailoring approaches based on regional expectations and regulatory environments is crucial. O&G companies, especially in the Americas and Europe, should strategically choose auditors (Top4 vs. 'other') based on their specific goals. Top4 auditors might enhance reporting in certain contexts, while 'other' auditors may offer advantages in different situations. Managers need to carefully consider their choice of auditors. The findings suggest that Top4 auditors may play a significant role in specific regions, emphasizing the strategic importance of selecting auditors aligned with organizational goals and regional contexts.

On the contrary to the corporate governance factors, board committee was found not to have significant influence on the likelihood of reporting for O&G companies in the Americas. This makes intuitive sense because, sustainability committees and audit committees are formed to

supervise the activities of the board of directors, hence, these committees have greater influence on strategic decision and show a reliable representation of stakeholders, and a mediator in the principal-agency relationship. The implication is that, the agency and stakeholder theory that posit an influence of corporate governance on sustainability reporting supports the governance-sustainability reporting practices for O&G companies in Asia but not for the Americas and Europe. The study finding confirms the importance of agency theory (Correa-Garcia et al., 2020; Vitolla, Raimo, Rubino, et al., 2020) and stakeholder theory (Freeman et al., 2018) in the sustainability reporting argument. The finding further confirms the findings of Khan (2010), Khan et al. (2013), Amran et al. (2014), Liu & Zhang (2017), and Khan et al. (2021), but contrary for the Americas and Europe.

Regarding the mediating role of audit quality on the performance-sustainability reporting relationship, the following implications are eminent for O&G companies generally, for O&G companies in the Americas and Oceania;

Globally the study reveals that Top4 auditors significantly impact sustainability reporting for global O&G companies, with a steadier influence across various indicators. The findings support existing theories linking sustainability performance and reporting, highlighting the critical role of auditor choice in shaping this relationship.

In the Americas, 'other non-Top4' auditors show a notable impact on sustainability reporting, emphasizing the need for a diversified auditor approach. The study challenges the dominance of Top4 auditors, urging managers to strategically select auditors based on organizational goals, particularly leveraging the positive impact of 'other' auditors on ESG reporting.

For Oceania, the study underscores the pivotal role of 'other non-Top4' auditors in influencing sustainability reporting dynamics. The findings offer strategic insights for managers, suggesting that engaging with 'other' auditors enhances reporting probabilities, aligning with a proactive sustainability approach.

The results advocate for a strategic alignment between sustainability goals and auditor selection globally. Choosing 'other non-Top4' auditors emerges as a proactive strategy, positioning organizations to strengthen sustainability reporting, meet expectations, and leverage reporting as a strategic tool for reputation and stakeholder engagement. This holistic understanding emphasizes sustainability reporting not merely as a compliance measure but as a strategic initiative with tangible benefits tied to auditor choices and sustainability performance.

In summary, organizations can enhance their sustainability reporting by adopting integrated practices, considering regional variations, strategically selecting auditors, strengthening governance structures, and ensuring compliance with evolving regulations. These actions contribute to improved transparency, stakeholder trust, and long-term sustainability outcomes. We conclude on the hypothesis for each panel below. The summary is based on the full models, with and without interactions for sustainability performance, AuQ, and Sr relationship although all the sustainability indicator variables were significant in the simple models.

Table 48: Expected and Actual Sign on Sustainability performance, AuQ, and Sr relationship

Variables	Expt	Group	America	Asia	Europe	Oceania
EnP	+	+	+	+	+	+
SoP	+					+
GvP	+	+	+	+		
ESG	+	+	+	+		+
AuQ (none):						
Other non-Top4	+	+				NC
Top4	+	NC			-	-
Interaction Effects:						
ESG & Top4	+	+				+
ESG & Top4	+	+				
ESG & Top4	+					
ESG & Top4	+	-				+

Author's construction, 2023; NC = not computed

6.4 Summary of Conclusion on Hypothesis

The conclusion is based for respective hypothesis where applicable. In summary we make the following conclusion based on the study result and proposed hypothesis. We fail to reject H_{1A}, H_{2A}, H_{3A}, H_{4A}, H_{6A}, H_{12A}, H_{13A}, H_{15A}, and H_{16A} because the study findings show significant a-priori signs, and we reject H_{5A}, H_{7A}, H_{8A}, H_{9A}, H_{10A}, H_{14A}, and H_{17}, because the study findings were not significant or did not show the a-priori signs.

For the American O&G companies, We fail to reject H_{1A}, H_{3A}, H_{4A}, H_{6A}, H_{12A}, H_{13A}, H_{15A}, and H_{16A} because the study findings show significant a-priori signs, and we reject H_{2A}, H_{5A}, H_{7A} to H_{17A}, because the study findings were not significant or did not show the a-priori signs.

For the Asian O&G companies, We fail to reject H_{1A}, H_{3A}, H_{4A}, H_{6A}, H_{8A}, and H_{10A} because the study findings show significant a-priori signs, and we reject H_{2A}, H_{5A}, H_{7A} to H_{17A}, because the study findings were not significant or did not show the a-priori signs.

For the European O&G companies, We fail to reject H_{1A} because the study findings show significant a-priori signs, and we reject all other applicable hypothesis associated with the European panel because the study findings were not significant or did not show the a-priori signs.

For the Oceanian O&G companies, We fail to reject H_{1A}, H_{4A}, H_{14A}, and H_{17A}, because the study findings show significant a-priori signs, and we reject all other applicable hypothesis associated with the Oceanian results because the study findings were not significant or did not show the a-priori signs.

Chapter Seven

Results and Discussion: Determinants of Sustainability Performance

7.1 Introduction

This chapter provide answers to RQ3 which hypothesize a relationship between sustainability performance (SP) on the one hand, and sustainability reporting (Sr), corporate governance (COM, Bsz, BGd, BI and CEOBm), country-level regulations on the environment and sustainability (EPS and MandRpt), and auditing quality and institutional standards (AuQ and GRI). It also addresses the questions on the role of corporate governance, MandRpt, and AuQ on the relationship between Sr and SP (H_{15} - H_{19}, H_{20}, and H_{21} respectively). The findings are reported in Table 49 to Table 53 for the global panel and separately for the regional panels. In these tables 8 different models (M1 to M8) are estimated. The first four models (M1-M4) show results for a simple model were EnP, SoP, GvP, and ESG are regressed on the key predictors without controls and account for fixed effects. M5 presents the results for the full model (without interactions) but with controls and considerations for year, regional and industry fixed effects. M6-M8 are full models with interactions. In model 6, we include the interaction between reporting and board characteristics. M7 include interaction between Sr and MandRpt, and M8 have the interaction term for Sr and AuQ included. The model statistics are presented at the bottom of each table and for each model where present.

7.2 Results: Determinants of Sustainability Performance

7.2.1 The Global Panel

The result for the global panel is presented in Table 49. It shows that all the models are significant [*p(chi2) < 0.01*]. The R-squared statistics also indicate that approximately 64% to 78% of the variations in sustainability performance is explained by the regressors. The predicted coefficient of Sr is 9.00, 5.38, 4.19, and 6.38 in M1 to M4 respectively with $p < 1\%$ for all. This shows that relative to not reporting, reporting has positive associated with EnP, SoP, GvP, and ESG. The same result is found in M5 (full model with firm controls, years fixed effect, region, and industry fixed effect but without interaction), and M7 and M8 (full models with interactions). This means than with or without accounting for interaction and other controls, O&G companies that report of their sustainability performs at least 4.19 point-scores more than their non-reporting counterparts.

The results for board characteristics show significant positive effect on sustainability performance for EnP, SoP, and ESG while the effect of having 'all three' committees relative to none is almost twice as having only two committees. For instance, in M4 the predicted coefficient for all-3 is 11.60 relative to 5.73 for two_comm. This result is true for the other models where both categories of COM are significant. Similar to COM, the predicted coefficients for Bsz is positive and significant in all the models except in M3 and M6. The estimated coefficients of BGd is positive and significant for all the models, showing the highest ($\beta = 0.39, p < 0.01$) and lowest ($\beta = 0.13, p < 0.01$) in M3 and M6 respectively. BI is shown to have significant positive association with sustainability performance for all

component and composite scores except for SoP (M2). CEOBm was not significant in any of the models.

The estimated coefficient of GRI is significant and positive in all the models reporting a high of 22.77 and a low of 15.62. Auditing by Top4 also reported significant positive coefficients for all 7 out of the 8 models. This means that apart for governance performance, companies audited by Top4 are associated with significant high performance – at least 3.91-point score higher than their comparators who do not consort or engage non-Top4 auditors. This means that apart for GvP, consulting Top4 promotes higher sustainability performance for O&G companies based on global average.

For the effect of interactions, we examine the results in Models M6 to M8. For instance, in M6 (interaction between reporting and board characteristics), all interaction terms are shown not to be significant predictors of sustainability performance. The same applies to M7 and M8 where the interaction between mandatory reporting and sustainability reporting has not significant association with performance. Likewise, the interaction between reporting and auditing by Top4.

Other results are worth noting. For instance, the size of the firm (SZ) is shown to have positive and significant association with ESG performance for the model with and without interactions. Relative to O&G companies in the Americas, the regional dummy show approximately 10 points-score and 9 points-score higher for O&G companies in Asia and Europe respectively at 1% statistical significance ($p < 0.01$).

Table 49: Panel Regression Results for Global Panel

Variables	EnP M1	SoP M2	GvP M3	ESG M4	ESG M5	ESG M6	ESG M7	ESG M8
Sr (base=no): yes	9.002***	5.384***	4.187***	6.379***	4.254***	-5.899	4.442***	4.393***
	(0.896)	(1.054)	(1.300)	(0.764)	(0.753)	(5.029)	(0.964)	(0.780)
COM (base=none):								
only_1	3.241	5.216*	-4.585	2.037	1.998	-0.114	1.970	2.318
	(2.400)	(2.802)	(3.455)	(2.038)	(1.935)	(3.901)	(1.939)	(1.985)
two_comm	5.491**	11.215***	-2.386	5.733***	6.043***	3.318	6.047***	6.311***
	(2.608)	(3.012)	(3.710)	(2.200)	(2.092)	(4.055)	(2.093)	(2.127)
all_3	10.452***	16.765***	5.170	11.595***	11.996***	7.175*	11.971***	12.255***
	(2.803)	(3.230)	(3.978)	(2.361)	(2.259)	(4.267)	(2.261)	(2.288)
Bsz	0.708***	0.763***	-0.210	0.529***	0.246*	0.007	0.249*	0.240*
	(0.158)	(0.181)	(0.222)	(0.132)	(0.135)	(0.238)	(0.136)	(0.136)
BGd	0.138***	0.218***	0.392***	0.233***	0.156***	0.131***	0.156***	0.156***
	(0.031)	(0.036)	(0.044)	(0.026)	(0.027)	(0.044)	(0.027)	(0.027)
BI	0.040*	-0.014	0.256***	0.066***	0.097***	0.074**	0.097***	0.098***
	(0.022)	(0.026)	(0.031)	(0.019)	(0.018)	(0.032)	(0.018)	(0.019)
CEOBm (base=no): yes	0.522	-1.199	-1.691	-0.653	-0.660	-0.365	-0.689	-0.566
	(1.385)	(1.595)	(1.964)	(1.166)	(1.105)	(1.615)	(1.107)	(1.112)
EPS (base=weak EP): strong EP	0.622	0.809	-1.344	0.248	-0.499	-0.561	-0.507	-0.510
	(0.589)	(0.700)	(0.865)	(0.505)	(0.547)	(0.548)	(0.549)	(0.548)
MandRpt (base=no): yes	-0.476	1.303	-2.812	-0.239	-1.118	-1.142	-0.826	-1.093
	(1.414)	(1.548)	(1.898)	(1.155)	(1.172)	(1.169)	(1.587)	(1.174)
GRI (base=no): yes	17.856***	22.766***	15.615***	19.756***	17.383***	17.518***	17.354***	17.374***
	(1.957)	(2.047)	(2.503)	(1.552)	(1.480)	(1.469)	(1.481)	(1.482)
AuQ (base=non-Top4): Top4	6.901***	7.371***	2.385	6.037***	4.171***	3.906***	4.186***	5.998**
	(1.031)	(1.204)	(1.485)	(0.876)	(0.847)	(0.856)	(0.849)	(2.657)

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Continuation of Table 49

Variables	EnP M1	SoP M2	GvP M3	ESG M4	ESG M5	ESG M6	ESG M7	ESG M8
Sr#COM:								
yes # only_1						3.344		
						(4.564)		
yes # two_comm						4.637		
						(4.609)		
yes # All_3						7.356		
						(4.809)		
Sr(yes) # Bsz						0.297		
						(0.242)		
Sr(yes) # BGd						0.043		
						(0.050)		
Sr(yes) # BI						0.026		
						(0.034)		
Sr(yes) # CEOBm(yes)						0.154		
						(1.947)		
Sr(yes) # MandRpt(yes)							-0.378	
							(1.333)	
Sr(yes) # AuQ(Top4)								-1.888
								(2.599)
SZ					1.220***	1.292***	1.225***	1.217***
					(0.315)	(0.317)	(0.315)	(0.316)
Region (base=Americas):								
Asia					10.247***	10.299***	10.196***	10.224***
					(2.350)	(2.318)	(2.341)	(2.357)

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Continuation of Table 49

Variables	EnP M1	SoP M2	GvP M3	ESG M4	ESG M5	ESG M6	ESG M7	ESG M8
Europe					8.860***	8.884***	8.832***	8.822***
					(2.280)	(2.249)	(2.269)	(2.287)
Oceania					-0.970	-1.521	-1.045	-1.120
					(2.852)	(2.824)	(2.862)	(2.866)
Industry (base=O&G E&P):								
O&G Integrated					10.119***	10.107***	10.086***	10.146***
					(2.943)	(2.905)	(2.926)	(2.951)
O&G R&M					5.991***	5.976***	5.985***	5.998***
					(1.897)	(1.867)	(1.886)	(1.903)
Constant	0.938	2.792	24.676***	7.203**	-24.784***	-19.853***	-25.036***	-25.198***
	(3.437)	(3.820)	(4.694)	(2.828)	(6.888)	(7.603)	(6.877)	(6.935)
Observations	1,204	1,204	1,204	1,204	1,204	1,204	1,204	1,204
R-squared	0.642	0.639	0.385	0.681	0.779	0.781	0.779	0.779
Number of Comp	152	152	152	152	152	152	152	152
Firm Control	no	no	no	no	Yes *	Yes *	Yes *	Yes *
Year_FE	no	no	no	no	yes	yes	yes	yes
Regn_FE	no	no	no	no	yes **	yes **	yes **	yes **
Ind_FE	no	no	no	no	yes **	yes **	yes **	yes **
chi2	542.8	542.1	378.9	847.9	1218	1262	1227	1214
Prob Chi2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

7.2.2 Americas

Table 50 show the regression results for O&G companies in the Americas. A chi2 probability less than 1% indicates that all the models except M8 is statistically significant. The results for M1, M2, M3, and M4 indicates that reporting on corporate sustainability (Sr), having a relatively larger board size (Bsz), having more women on corporate boards (BGd), reporting by GRI standards (GRI), and the use of quality reporting (by way of consulting by Top4 external auditing companies (Top4) have positive implications for environmental performance (EnP), social performance (SoP), governance performance (GvP), and overall sustainability performance (ESG) respectively for American O&G companies. This is not true for the influence of Bsz and AuQ (Top4) for GoP as result show insignificant predicted coefficients. In addition, positive and significant coefficients (mostly 5%) for all_3 means that having all 3 board committees relative to none, increases performance by approximately 9 to 15 points score.

By controlling for firm characteristics (M5), the results of M4 remained the same but also indicated that firm size has implications for ESG scores, hence, sustainability performance. Apart for M3, an R-squared greater than 50% was reported, indicating that the predictors explain approximately 58% to 78% of the variations in sustainability performance. In addition, a coefficient of 0.22 and 0.05 show a positive relationship exists between BI and SoP, and BI and ESG respectively. The effect of a moderating variable on the relationship between Sr and SP is examined with models M6 to M8.

To examine the mediately role of board characteristics, mandatory reporting, and the quality of external auditors on the relationship between sustainability reporting and sustainability performance, we use the results form M6, M7, and M8 respectively. Firstly, the statistically significant coefficients of Sr (4.94 and 5.28 for M7 and M8 respectively), Bsz (0.41 for both M7 and M8), BGd (0.17 to 0.18 for M6, M7, and M8), and GRI (14.5, 14.91 and 14.80 for M6, M7 and M8) affirms the statistically positive influence on sustainability performance from the base model. In addition, the positive significant coefficient of firm size (SZ) for M5 to M8 indicates that the size of the firm matters in sustainability performance.

M6, M7, and M8 shows the results for the extended model which interacts board characteristics, mandatory reporting, and auditor quality with sustainability reporting to ascertain the moderating effect on the Sr-SP relationship. 6 show a coefficient of -15.84 and 0.57 for Sr(yes)#two_comm and Sr(yes)#Bsz respectively which are both significant at 10%. This means that having only two boards reduces the positive effect (11.34) of the relation from Sr to sustainability performance (SP), while an increase in board size indirectly increases performance by 0.57 points score for firms that report on its sustainability. Although the coefficients of the other two interactions have positive signs, they are all not significant.

The asterisk by the various effects is just an indication that some of the control variables were significant. However, we only show results for the firm controls. Only SZ was significant (highly significant at 1%which p-values <1%). The industry dummies were all not significant.

Table 50: Panel Regression Results for Americas

Variables	EnP M1	SoP M2	GvP M3	ESG M4	ESG M5	ESG M6	ESG M7	ESG M8
Sr (base=no): yes	9.719***	5.410***	5.488***	6.977***	5.275***	14.245	4.943***	5.275***
	(1.027)	(1.267)	(1.673)	(0.894)	(0.897)	(9.269)	(1.059)	(0.897)
COM (base=none):								
only_1	2.146	-2.619	1.304	-0.478	0.119	2.591	0.185	0.119
	(4.517)	(5.512)	(7.196)	(3.891)	(3.723)	(5.783)	(3.728)	(3.723)
two_comm	4.900	-1.491	5.797	1.812	3.577	11.363*	3.477	3.577
	(4.936)	(5.967)	(7.724)	(4.214)	(4.025)	(6.211)	(4.028)	(4.025)
all_3	10.910**	5.638	12.308	8.380*	9.064**	15.114**	9.023**	9.064**
	(5.072)	(6.129)	(7.931)	(4.329)	(4.133)	(6.286)	(4.134)	(4.133)
Bsz	0.470**	0.610**	0.278	0.497**	0.413**	0.059	0.408**	0.413**
	(0.227)	(0.276)	(0.360)	(0.195)	(0.198)	(0.286)	(0.199)	(0.198)
BGd	0.212***	0.214***	0.385***	0.256***	0.175***	0.166***	0.175***	0.175***
	(0.042)	(0.052)	(0.068)	(0.036)	(0.038)	(0.054)	(0.038)	(0.038)
BI	0.044	-0.045	0.221***	0.048*	0.039	0.031	0.039	0.039
	(0.033)	(0.040)	(0.052)	(0.028)	(0.028)	(0.048)	(0.028)	(0.028)
CEOBm (base=no): yes	-0.540	-1.568	-0.458	-0.975	-0.474	1.090	-0.493	-0.474
	(1.761)	(2.145)	(2.796)	(1.515)	(1.450)	(1.808)	(1.451)	(1.450)
EPS (base=weak Ep): strong EP	-0.355	0.454	-1.565	-0.297	-0.681	-0.759	-0.624	-0.681
	(0.666)	(0.826)	(1.095)	(0.582)	(0.717)	(0.713)	(0.724)	(0.717)
MandRpt (base=no): yes	-1.394	-1.346	-5.569	-2.289	-1.288	-1.735	-2.014	-1.288
	(3.025)	(3.375)	(4.097)	(2.391)	(2.240)	(2.271)	(2.514)	(2.240)
GRI (base=no): yes	15.283***	18.604***	11.545***	16.042***	14.793***	14.539***	14.905***	14.793***
	(2.549)	(2.891)	(3.557)	(2.047)	(1.957)	(1.971)	(1.962)	(1.957)
AuQ (base=non-Top4): Top4	3.897*	9.689***	-3.023	4.755**	2.982	2.551	2.960	2.982
	(2.183)	(2.677)	(3.512)	(1.890)	(1.862)	(1.856)	(1.864)	(1.862)
Sr#COM:								
yes#only_1						-5.654		
						(7.745)		

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Continuation of Table 50

Variables	EnP M1	SoP M2	GvP M3	ESG M4	ESG M5	ESG M6	ESG M7	ESG M8
yes # two_comm						-15.839*		
						(8.414)		
yes # all_3						-12.437		
						(8.519)		
Sr(yes) # Bsz						0.566*		
						(0.314)		
Sr(yes) # BGd						0.029		
						(0.067)		
Sr(yes) # BI						0.040		
						(0.052)		
Sr(yes) # CEOBm(yes)						-3.864		
						(2.501)		
Sr(yes)#MandRpt(yes)							1.052	
							(1.722)	
Sr # AuQ:								
No # Top4								0.000
								(empty)
Yes # Top4								0.000
								(omitted)
SZ					1.694***	1.705***	1.728***	1.694***
					(0.412)	(0.418)	(0.414)	(0.412)
Constant	-1.453	17.540***	16.718*	11.089**	-30.052***	-34.006***	-30.413***	-30.052***
	(5.658)	(6.738)	(8.624)	(4.762)	(9.197)	(10.430)	(9.199)	(9.197)
Observations	600	600	600	600	600	600	600	600
R-squared	0.611	0.586	0.383	0.671	0.766	0.777	0.766	0.766
Number of Comp	75	75	75	75	75	75	75	75
Firm Control	no	no	no	no	yes *	yes *	yes *	yes *
Year_FE	no	no	no	no	yes	yes	yes	yes
Ind_FE	no	no	no	no	yes	yes	yes	yes
chi2	370.4	233.9	166.6	476.5	671.4	688.9	673.9	-
Prob Chi2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

7.2.3 Asia

Table 51 show the panel regression results for O&G companies in Asia. The chi2 statistics and the associated probability show the overall significance of our overalls. The R-squared statistics also indicate that at approximately 60%, 81%, 23% and 84% of variations in EnP, SoP, GVP and ESG (base model) is explained for by the predictors. Similarly, it shows that more than 83% of the variations in ESG scores in the extended and moderated models are accounted for by the regressors.

Evidently, Sr significant positive influence on EnP (9.83), and ESG (5.01 and 6.03 in M4 and M8 respectively). Having all 3 board committees show significant positive coefficient of approximately 10 to 15 for EnP, GvP, and ESG scores, and the highest and most significant (25.06) for SoP. Board size was only significant in M3 (-0.79) and M4 (-0.48), albeit showing negative signs. This means that an increase in board size is associated unit less than 1 point score reduction in sustainability performance. BI, GRI, and AuQ (Top4) was significant in all the base models (M1-M5) and with positive signs indicating positive influence on sustainability performance. For instance, a percentage increase in board independence is shown to increase sustainability performance of all forms (components or composite ESG score) by approximately 1 point score, while increasing adoption of GRI increases performance by at least 24.29 to 31.95 points score for the component scores (see M1 and M2 column), and 25.65 to 31.78 points score for the composite ESG score. Similar directional effect can be said for reporting by Top 4. This shows a positive of 3.59 (for SoP) to 27.78 for (ESG). CEOBm show significant negative (-10.90) effect on governance performance. MandRpt also reported a negatively significant (-4.28) coefficient for ESG in M5.

The results for the interactions of board characteristics show that having all three board committees positively moderates the relationship between Sr and SP (ESG scores) as indicated with a coefficient of 11.34 at 10% significance. Likewise, BI positively influence the relationship between Sr and ESG score by 0.34-point score at 5% level of significance. The findings suggest that fostering a board structure with all three key committees and ensuring a high level of board independence can magnify the positive impact of sustainability reporting on ESG scores. MandRpt is reported to have no moderating influence on ESG score through Sr, while the interaction of auditing by Top4 report significant negative coefficient [$\beta = -25.27$, $p<0.01$].

The significant negative coefficient observed in the interaction of auditing by Top4 implies that the relationship between sustainability reporting and sustainability performance (ESG scores) is adversely moderated by the involvement of Top4 auditors in the Oil and Gas sector. A negative coefficient of -25.27, with a high level of significance ($p<0.01$), suggests a substantial reduction in the positive impact of sustainability reporting on ESG scores when the audit is conducted by Top4 audit firms. This result contradicts the expectation of a positive moderation effect and calls for a nuanced understanding of the role of Top4 auditors in influencing sustainability outcomes.

From a theoretical perspective, this finding challenges the assumption that engagement with Top4 audit firms enhances the effectiveness of sustainability reporting in driving positive sustainability performance.

For the extended models M5-M8 in which we controlled for firm characteristics, time fixed effects, and industry fixed effects, ROE reports a significant negative coefficient ranging from -9.71 to -13.37 for all, and at a 5% level of significance. Overall, BGd and EPS are shown to have no significant influence on sustainability performance for all the models. Further, CEOBm was not significant for EnP, SoP and overall ESG (even after controlling for firm characteristics, after interaction, and invoking the time and industry fixed effects.

Table 51: Panel Regression Results for Asia

Variables	EnP M1	SoP M2	GvP M3	ESG M4	ESG M5	ESG M6	ESG M7	ESG M8
Sr (base=no): yes	9.827**	3.262	0.680	5.014*	1.940	-5.635	-0.232	6.029*
	(4.054)	(3.705)	(3.851)	(2.982)	(3.102)	(11.904)	(4.424)	(3.245)
COM (base=none):								
only_1	-2.278	7.547**	-5.847	1.171	0.381	1.634	0.571	5.699*
	(4.127)	(3.595)	(3.997)	(2.972)	(2.968)	(8.999)	(3.043)	(3.273)
two_comm	7.273	20.478***	-7.380	8.394**	6.189*	11.549***	6.254*	10.477***
	(4.786)	(3.939)	(4.830)	(3.344)	(3.429)	(3.085)	(3.511)	(3.558)
all_3	10.958*	25.058***	10.363*	14.802***	10.599**	0.00	10.975**	15.219***
	(5.854)	(4.658)	(6.071)	(4.011)	(4.247)	(omitted)	(4.363)	(4.343)
Bsz	-0.398	-0.418	-0.788**	-0.482*	-0.294	0.889	-0.288	-0.314
	(0.369)	(0.324)	(0.355)	(0.267)	(0.270)	(1.098)	(0.272)	(0.263)
BGd	0.028	-0.041	0.085	0.019	-0.041	-0.325	-0.036	-0.032
	(0.108)	(0.097)	(0.103)	(0.079)	(0.082)	(0.226)	(0.083)	(0.080)
BI	0.214***	0.232***	0.186***	0.217***	0.192***	-0.032	0.191***	0.217***
	(0.070)	(0.065)	(0.066)	(0.052)	(0.052)	(0.124)	(0.052)	(0.051)
CEOBm (base=no): yes	5.122	-6.337	10.897**	2.832	2.707	-6.039	3.771	8.366**
	(4.492)	(3.956)	(4.320)	(3.253)	(3.161)	(8.865)	(3.453)	(3.490)
EPS (base=weak EP): strong EP	-1.463	-3.673	2.786	-0.499	-2.063	-0.524	-2.019	-2.206
	(2.440)	(2.276)	(2.316)	(1.806)	(1.917)	(1.825)	(1.927)	(1.868)
MandRpt (base=no): yes	-4.741	-2.364	0.697	-2.858	-4.277*	-5.421***	-6.709	-4.304**
	(2.947)	(2.477)	(2.942)	(2.078)	(2.234)	(2.007)	(4.440)	(2.173)
GRI (base=no): yes	24.792***	31.945***	13.851	25.650***	31.561***	27.130***	31.755***	28.284***
	(6.244)	(3.921)	(9.072)	(3.714)	(4.355)	(3.357)	(4.538)	(4.331)
AuQ (base=non-Top4): Top4	9.505***	3.585*	4.808**	5.826***	4.448**	1.956	4.333**	27.782***
	(2.435)	(2.165)	(2.333)	(1.771)	(1.757)	(1.646)	(1.787)	(6.985)
Sr # COM:								

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Continuation of Table 51

Variables	EnP M1	SoP M2	GvP M3	ESG M4	ESG M5	ESG M6	ESG M7	ESG M8
Sr(yes) # only_1						4.912		
						(9.892)		
Sr(yes) # all_3						11.343***		
						(3.674)		
Sr(yes) # Bsz						-1.136		
						(1.104)		
Sr(yes) # BGd						0.196		
						(0.243)		
Sr(yes) # BI						0.342**		
						(0.135)		
Sr(yes) # CEOBm(yes)						11.115		
						(9.802)		
Sr(yes) # MandRpt(yes)							3.167	
							(4.728)	
Sr(yes) # Top4								-25.270***
								(7.333)
ROe					-9.709**	-13.372**	-9.945**	-10.945**
					(4.854)	(5.255)	(4.861)	(4.745)
Constant	13.640*	16.552***	28.197***	16.863***	7.960	-40.162*	12.209	-16.357
	(7.657)	(6.000)	(9.326)	(5.133)	(23.525)	(22.692)	(24.057)	(23.910)
Observations	231	231	231	231	231	231	231	231
R-squared	0.604	0.808	0.231	0.761	0.837	0.877	0.833	0.844
Number of Comp	29	29	29	29	29	29	29	29
Firm Control	no	no	no	no	yes *	yes *	yes *	yes *
Year_FE	no	no	no	no	yes	yes	yes	yes
Ind_FE	no	no	no	no	yes	yes	yes	yes
chi2	99.65	283.6	60.33	212.7	271	-	249.4	299.7
Prob Chi2	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

7.2.4 Europe

In Table 52 the R-squared statistics indicate that the regression models explain approximately 51% (in M3) to 79% (in M5) of the variations in sustainability performance. The Chi-squared (Chi2) probabilities means that the model highly significant at 1% (Prob Chi2 < 0.01). The firm level control show that three firm variables (indicated by 3 asterisks and reported in the table). That is, SZ, LEV, and ROE have respective positive, negative, and negative influence on ESG performance. Three firm-control variables reported significant outcomes in the model for all respective models (M5-M8). SZ show positive coefficients (2.27, 2.44, 2.10, 2.11) for M5, M6, M7, and M8 respectively mostly at 5% level of significance. LEV and ROE reported negative significant coefficients (-0.58, -0.65, -0.58, -0.58) all at 5%, and (-4.16, -5.08, -4.06, -4.16) all at 1% respectively for M5, M6, M7, and M8.

In the table, we find that Sr is only significant in M6 with a coefficient of -41.014 at 5%. Having all 3 committees (all_3) is significant in M2, M4, M5, M7 and M8 with positive coefficients of 18.58, 10.88, 15.16, 15.30, and 15.42 respectively. Bsz is only significant in M1 and M2 with positive coefficients of 0.61 and 0.72 respectively. BGd is significant in all the models except M1, and also positively signed in the models except M6 which show negative coefficient (-0.80). BI was only significant for EnP (at 5%) and GvP (at 1%) showing positive coefficient of 0.08 and 0.23 respectively. CEOBm reported coefficient of -4.80 showing significant negative relationship with ESG score at 10%. The coefficients of GRI and AuQ (Top4) show positive relationship with sustainability performance indicators, both components and composite scores. On the contrary, regulations on sustainability, that is, EPS and MandRpt reports no significant coefficient. Likewise, CEOBm show insignificant influence on EnP, SoP, GvP, and ESG (M4 and M5).

In relation to the moderating effect of board characteristics, MandRpt, and AuQ on Sr-SP relationships, we focus on M6, M7, and M8 in Table 52. The interaction of board characteristics, specifically, Sr and COM (yes#all_3) and BGd with Sr (Sr(yes) # BGd) were significant with coefficients of 16.15 and 1.05, both at 1% level of significance. The interaction of Sr and MandRpt (yes#yes) and AuQ and Sr (yes#Top4) were not significant in the model.

In M8, no significant main effect of COM on sustainability performance (ESG) was shown. There was a significant main effect of BGd on ESG scores [β =*-0.08, p<0.01*], indicating that higher proportion of women on corporate board (BGd) was associated with lowers ESG scores. However, these results were qualified by a significant interaction between sustainability reporting status and number of board committees [β *=16.15, p<0.01*] and the significant interaction between Sr and BGd [β *=1.06, p<0.01*]. This means that the effect of COM on ESG depends on the number of board committees and the proportion of female on the corporate board. Specifically, having all three board committees as associated with higher ESG score (sustainability performance) for sustainability-reporting O&G companies. Similarly, sustainability performance effect of having more females on corporate boards was higher for reporting companies that non-reporting companies.

Table 52: Panel Regression Results for Europe

Variables	EnP M1	SoP M2	GvP M3	ESG M4	ESG M5	ESG M6	ESG M7	ESG M8
Sr (base=no): yes	0.206	-0.167	2.669	-0.109	0.424	-41.014**	6.340	-1.345
	(2.959)	(3.998)	(5.189)	(2.919)	(2.935)	(20.094)	(6.033)	(4.301)
COM (base=none):								
only_1	-2.309	2.233	-11.102	-2.594	0.978	-	0.898	0.901
	(5.648)	(7.945)	(10.247)	(5.656)	(5.789)	(omitted)	(5.747)	(5.756)
two_comm	1.271	12.847	-3.512	4.689	7.517	8.068	7.568	7.606
	(5.901)	(8.273)	(10.676)	(5.902)	(5.990)	(5.816)	(5.948)	(5.968)
all_3	8.914	18.576**	0.420	10.884*	15.156**	-	15.296**	15.420**
	(6.150)	(8.586)	(11.087)	(6.141)	(6.242)	(omitted)	(6.201)	(6.233)
Bsz	0.612**	0.715*	-0.602	0.370	0.314	-0.406	0.362	0.327
	(0.296)	(0.379)	(0.495)	(0.286)	(0.304)	(1.897)	(0.307)	(0.307)
BGd	0.047	0.262***	0.582***	0.271***	0.192***	-0.804***	0.200***	0.196***
	(0.049)	(0.065)	(0.085)	(0.048)	(0.054)	(0.244)	(0.054)	(0.055)
BI	0.077**	-0.035	0.230***	0.058	0.055	-2.162	0.055	0.053
	(0.036)	(0.049)	(0.063)	(0.036)	(0.036)	(1.431)	(0.036)	(0.036)
CEOBm (base=no): yes	-4.524	-6.183	-0.486	-4.810	-5.349*	63.957	-5.388*	-5.434*
	(3.347)	(3.950)	(5.219)	(3.118)	(2.950)	(75.060)	(2.977)	(2.989)
EPS (base=weak EP): strong EP	-1.273	2.376	-5.490	-0.713	2.144	1.883	1.992	2.087
	(3.217)	(3.882)	(5.108)	(3.018)	(3.204)	(3.097)	(3.219)	(3.228)
MandRpt (base=no): yes	-0.346	1.421	-3.655	-0.311	-0.099	-0.374	6.665	-0.208
	(1.932)	(2.538)	(3.304)	(1.880)	(2.070)	(2.053)	(6.138)	(2.083)

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Continuation from Table 52

Variables	EnP M1	SoP M2	GvP M3	ESG M4	ESG M5	ESG M6	ESG M7	ESG M8
GRI (base=no): yes	32.730***	32.441***	20.964***	29.991***	23.928***	17.794***	24.141***	24.242***
	(5.759)	(5.364)	(7.245)	(4.743)	(4.330)	(4.393)	(4.459)	(4.492)
AuQ (base=non-Top4): Top4	4.503***	7.677***	1.847	5.130***	4.384***	4.279***	4.378***	1.727
	(1.360)	(1.859)	(2.408)	(1.347)	(1.408)	(1.365)	(1.402)	(5.882)
Sr # COM:								
yes # only_1						0.836		
						(5.612)		
yes # two_comm						0.000		
						(omitted)		
yes # All_3						16.146***		
						(6.073)		
Sr(yes) # Bsz						0.719		
						(1.914)		
Sr(yes) # BGd						1.055***		
						(0.250)		
Sr(yes) # BI						2.207		
						(1.431)		
Sr(yes) # CEOBm(yes)						-68.036		
						(75.127)		
Sr (yes) # MandRpt (yes)							-7.546	
							(6.431)	
Sr(yes) # Top4								2.657
								(5.741)

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Continuation from Table 52

Variables	EnP M1	SoP M2	GvP M3	ESG M4	ESG M5	ESG M6	ESG M7	ESG M8
SZ					2.265**	2.442***	2.099**	2.110**
					(0.950)	(0.920)	(0.962)	(0.968)
LEV					-0.577**	-0.649**	-0.577**	-0.584**
					(0.272)	(0.264)	(0.271)	(0.271)
ROe					-4.157***	-5.082***	-4.064***	-4.163***
					(1.374)	(1.348)	(1.369)	(1.368)
Constant	18.010*	9.033	29.943**	18.505**	-37.019*	-	-39.499*	-32.355
	(9.305)	(11.448)	(14.972)	(8.718)	(20.994)	(omitted)	(21.586)	(21.648)
Observations	262	262	262	262	262	262	262	262
R-squared	0.654	0.704	0.519	0.716	0.793	0.842	0.785	0.784
Number of Comp	33	33	33	33	33	33	33	33
Firm Control	no	no	no	no	yes ***	yes ***	yes ***	yes ***
Year_FE	no	no	no	no	yes	yes	yes	yes
Ind_FE	no	no	no	no	yes	yes	yes	yes
chi2	117.7	187	143.5	219.2	308.9	-	300.1	295.9
Prob Chi2	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

7.2.5 Oceania

Table 53 presents the results for O&G companies in Oceania in relation to the factors that influences SP in the sector along with the moderation of board characteristics, mandatory reporting and auditor quality on the relationship between Sr and SP. For the base and models without interactions (M1 to M6), Sr was only significant for SoP [$\beta = 5.84, p<0.1$] and ESG [$\beta =4.14, p<0.1$]. Relative to have no board committee, having all three-board committee show significant positive influence on GvP in M3 [$\beta =26.52, p<0.5$]. Bsz reports significant outcomes for only M4 [$\beta =1.32, p<0.1$] while BGd reported significant positive coefficients for M2-M5, including the extended models (M6-M8) but insignificant for M1. CEOBm reported [$\beta =8.48, p<0.1$] and [$\beta =-14.81, p<0.01$] for SoP and GvP respectively but insignificant for the overall performance model. EPS is shown to have positive influence on EnP [$\beta =2.28, p<0.05$] but negative on GvP [$\beta =-4.71, p<0.1$] while MandRpt show significant positive relationship with GvP [$\beta =19.85, p<0.05$]. Further, GRI positively influences SoP, GvP and ESG and not EnP while reporting quality (AuQ) only positively influence EnP.

Following the interacted models M6-M8, we realize that Sr#Bsz, Sr(yes)#BI, and Sr(yes)#CEOBm(yes), show positive moderation of board characteristics on the relationship between Sr and SP with the following corresponding statistics [$\beta =7.49, p<0.01$], [$\beta =0.33, p<0.01$], and [$\beta =14.14, p<0.05$]. Further, Sr(yes)#MandRpt(yes) was not significant indicating that MandRpt does not moderate the relationship form Sr to SP. However, auditing by Top4 showed positive indirect effect on the Sr-SP relationship and highly significant [$\beta =18.70, p<0.01$]. This means that the effect of board characteristics such as companies with higher board size, high board independence, CEO as member of the board high significant positive effect on sustainability performance for reporting companies than non-reporting companies. Also, relative to non-reporting companies, companies that report on their sustainability show higher performance effect of consulting Top4 companies.

Although the R-statistics show that more than 50% of the variations in our dependent variable in the various model was explained for by the predictor variables, we could not ascertain the Ch2 statistic and for that matter, the goodness of fit of 6 out of the 8 models. We could only confirm that M2 and M4 were highly significant [$p\ (chi2) <0.01$].

Table 53: Panel Regression Results for Oceania

Variables	EnP M1	SoP M2	GvP M3	ESG M4	ESG M5	ESG M6	ESG M7	ESG M8
Sr (base=no): yes	2.845	5.837*	-0.749	4.142*	1.866	-74.453***	-4.655	-1.353
	(2.086)	(3.355)	(3.437)	(2.294)	(3.576)	(13.892)	(9.002)	(3.545)
COM (base=none):								
only_1	-4.131	-28.345	14.099*	-14.581	-20.332	-3.519	-10.362**	-11.182**
	(4.669)	(19.173)	(8.054)	(12.056)	(20.480)	(5.372)	(4.968)	(4.717)
two_comm	-2.456	-28.068	12.525	-15.228	-20.125	-1.338	-9.349**	-10.485**
	(2.987)	(19.632)	(8.919)	(12.417)	(20.666)	(4.957)	(4.554)	(4.235)
all_3	0.000	-30.850	26.520**	-12.884	-10.067	0.000	0.000	0.000
	(omitted)	(21.021)	(10.370)	(13.434)	(20.944)	(omitted)	(omitted)	(omitted)
Bsz	0.936	1.663	-0.387	1.322*	0.453	-2.932***	0.125	1.511
	(0.672)	(1.077)	(0.959)	(0.733)	(1.164)	(1.067)	(1.239)	(1.155)
BGd	0.065	0.253**	0.736***	0.242***	0.442***	0.384***	0.451***	0.349***
	(0.072)	(0.117)	(0.119)	(0.081)	(0.104)	(0.086)	(0.105)	(0.103)
BI	0.114**	0.193**	0.172*	0.232***	0.155**	0.093	0.162**	0.101
	(0.056)	(0.091)	(0.092)	(0.063)	(0.077)	(0.069)	(0.078)	(0.075)
CEOBm (base=no): yes	2.086	8.474*	-14.810***	0.885	2.661	-10.256*	3.416	0.987
	(2.844)	(4.640)	(5.668)	(3.210)	(5.031)	(5.931)	(5.133)	(4.809)
EPS (base=weak EP): strong EP	2.282**	1.142	-4.707*	0.333	7.510	10.668*	5.393	4.328
	(1.100)	(1.804)	(2.602)	(1.253)	(7.569)	(5.813)	(8.046)	(7.260)
MandRpt (base=no): yes	-4.822	9.997	19.848**	6.042	0.106	-15.077	-5.588	2.303
	(12.868)	(17.763)	(7.851)	(11.003)	(16.865)	(12.919)	(18.376)	(16.038)
GRI (base=no): yes	5.047	19.216***	16.853***	14.145***	6.094**	1.443	5.964**	3.923
	(3.306)	(5.231)	(3.101)	(3.523)	(2.568)	(1.959)	(2.579)	(2.533)
AuQ (base=non-Top4): Top4	5.457**	-0.048	2.200	3.410	4.850	5.526**	5.238	-10.094*
	(2.544)	(4.111)	(3.608)	(2.820)	(3.540)	(2.635)	(3.582)	(5.770)
Sr(no) # none						0.000		
						(empty)		

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Continuation of Table 53

Variables	EnP M1	SoP M2	GvP M3	ESG M4	ESG M5	ESG M6	ESG M7	ESG M8
Sr(yes) # only_1						2.457		
						(7.027)		
Sr(yes) # two_comm						5.768		
						(7.503)		
Sr(yes) # all_3						0.000		
						(omitted)		
Sr(yes) # Bsz						7.492***		
						(1.250)		
Sr(yes) # BGd						-0.244		
						(0.171)		
Sr(yes) # BI						0.333***		
						(0.110)		
Sr(yes) # CEOBm(yes)						14.141**		
						(5.909)		
Sr(yes) # MandRpt(yes)							7.376	
							(9.342)	
Sr(yes) # Top4								18.704***
								(5.868)
Constant	2.670	0.000	0.000	0.000	0.000	14.005	-5.625	-10.347
	(14.587)	(omitted)	(omitted)	(omitted)	(omitted)	(17.338)	(21.731)	(19.899)
Observations	111	111	111	111	111	111	111	111
R-squared	0.661	0.521	0.689	0.712	0.823	0.913	0.824	0.842
Number of Comp	15	15	15	15	15	15	15	15
Firm Control	no	no	no	no	yes	yes	yes	yes
Year_FE	no	no	no	no	yes	yes	yes	yes
Ind_FE	no	no	no	no	yes	yes	yes	yes
chi2	-	90.24	-	215.8	-	-	-	-
Prob Chi2	-	0.00	-	0.00	-	-	-	-

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

7.3 Discussion of Results

Table 54 summarizes the results for the determinants of sustainability performance based on the full models (without interactions and with interactions) and the a-priori (expected) signs. Apart for Europe, sustainability report is shown to have positive influence on sustainability performance for the global panel and for the other regions. This means that, O&G companies that report on their sustainability perform significantly better than the non-reporting counterparts.

The insignificance of sustainability reporting or reporting status in predicting sustainability performance for O&G companies in Europe can be attributed to the high voluntariness of reporting in for companies in Europe. In no relation to O&G companies in other regions, sustainability in Europe is an intentional, voluntary, and conscious endeavour of firms, to in the best interest of the firms and its constituents, to perform better regardless of their reporting status. Hence, reporting status of the company does not significantly influence their performance. This finding supports the signaling theory for the global panel and regional panel (except for Europe), that companies are high performers would want to signal their superior performance to stakeholder. This has shown to be through for reporting O&G companies. That, as far as they are reporting on their non-financial bottom lines, they would want to show positive signals in terms of their sustainability performance. The counter argument of possible greenwashing from sustainability reporting companies is eminent. However, this argument is more plausible in the face of mandatory reporting where firms are compelled to report. Nonetheless, Mandatory reporting is shown to be an insignificant predictor of sustainability performance, for the global and regional panels. Hence, the possible argument of greenwashing is overruled.

In relation to corporate governance attributes, number of board committee, Bsz, BGd, and BI conformed to the agency and stakeholder theories as discussed in literature. These governance indicators were all significant and correctly signed for the O&G companies globally. For the global panel and all regional panels, except for Europe where CEOBm should negative influence on sustainability performance, CEOBm is shown not to be a significant predictor of overall ESG performance of O&G companies. For all regions (except Oceania), having more board committees (in this case, all three committees – corporate board committee, auditing committee, CSR and sustainability committee) have significant positive implications for sustainability performance. This makes a strong argument for the agency and stakeholder theory because corporate board committees assume supervisory roles over strategic and operational decisions of the company, serving the interest of both internal and external stakeholders.

Adequate board committee imply the presence of diverse skills and experts, hence, purposeful resources (Rao & Tilt, 2016) available for the company to steer different context of the sustainability agenda. This provides support also for the resource dependency theory similar to the findings of Rao & Tilt (2016) on the board committees servings highly skilled. The finding on existence of board committees corroborates with that Mahmood & Orazalin (2017). The

positive significance of board size as reported by Mahmood & Orazalin (2017) on sustainability performance featured in the global panel and for the Americas. BGd and BI were significant in 3 and 2 of the regional panels respectively and for the global panel, supporting the stakeholder proposition and confirming findings of Buallay & Al-Ajmi (2019).

The institutional variables were not significant in determining sustainability performance for the O&G companies in all the regions and generally in the global panel results. This implies that, the level of sustainability performance of the O&G companies is not influenced by country level regulations. The possible intuition from these results is that, perhaps country-level regulation mandates reporting but not the performance target. Also, descriptive statistics show that apart from Europe, the average EPSI for Americas, Asia, and Oceania are below average index (less than 3).

The adoption of GRI guideline was found to positively influence sustainability performance in the global panel, in the Americas, Asia, Europe, and Oceania. The predicted coefficient of the GRI variable showed the most effect in terms of magnitude amongst all predictors. This reiterates the global adoption of the GRI guidelines and its importance in identifying material issue of sustainability. These findings also indicate how companies are intentional about sustainability given the GRI is the most globally adopted sustainability guidelines. The positive association is in line with literature (Gaudencio et al., 2020; Tarquinio et al., 2020) and the magnitude of the effects reflect how adoption of GRI guidelines differentiates sustainability performers and non-performers. Its universality is adoption and usage give a common ground for inter and intra-temporal comparism of companies within the same sector or industry.

The result for external factors indicates that the adoption of external auditors, especially the use of Top-4 auditing firms have significant positive effect on sustainability performance for the global panel, O&G in Asia, Europe and Oceania. Notably, the agency and stakeholder theory offer intuition for sustainability performance. Orazalin & Mahmood (2018) found similar relationship in a study of the Russian O&G industry and other empirical studies. Haniffa & Cooke (2002) also confirmed this result in their study in Malaysian corporations. The current finding on AuQ support previous studies and gives theoretical backing to the legitimacy theory where BIG auditing firms would want to legitimize their influence in corporate sustainability. As external agents of corporate sustainability, stakeholders of accountability, and key institutions for transparency and accountability, the findings for Top4 provide support for the agency, resource dependency, institutional, and stakeholder theories of sustainability.

Lastly, for the global panel, the O&G E&P companies are found to perform significantly less than the O&G integrated companies. This may be due to the fact the O&G E&Ps operations are more environmentally prone to controversy relative to the integrated companies where other operational units including retail and marketing components could contribute to increased ESG performance, in other words, reducing in environmental-related ESG controversies.

Table 54: Expected and Actual Sign on the Determinants of Sustainability Performance

Variables	Expt	Group	America	Asia	Europe	Oceania
Sr	+	+	+	+		+
COM (base=none):						
_only 1						-
Two_Comm	+	+				
All_3	+	+	+	+	+	
Bsz	+	+	+			
BGd	+	+	+		+	+
BI	+	+		+		+
CEOBMem (base=no): yes					-	
EPS	+					
MandRpt (base=no): yes	+					
GRI (base=no): yes	+	+	+	+	+	+
AuQ (base=non-Top4): Top4	+	+		+	+	+
Interaction Effects:						
1. Sr & Board charact.:						
Sr # _only 1	+					
Sr # two_comm	+	-				
Sr # all_3	+			+	+	
Sr # Bsz	+	+				+
Sr # BGd	+					
Sr # BI	+			+		+
Sr # CEOBm	±					+
2. Sr & MandRpt:						
yes # yes	+					
3. Sr # AuQ:						
yes # Top4	+			-		+

Author's construction, 2023

7.4 Theoretical and Managerial Implications

7.4.1 For the Americas:

The study's theoretical implications for the Americas' Oil and Gas sector provide valuable insights into the motivations driving sustainability reporting and performance. The findings align with organizational theories such as Legitimacy Theory, Resource-Based View, Institutional Theory, and Agency Theory. For managers in the region, the study suggests leveraging sustainability reporting for enhanced legitimacy and aligning with societal expectations. Emphasizing board size, gender diversity, and independence can positively impact sustainability outcomes. The use of recognized reporting standards like GRI is encouraged for credibility. While the absence of a significant effect of Big4 auditors implies a nuanced approach to audit firm selection, managers should consider context-specific optimizations for board structures.

7.4.2 For Asia

The theoretical implications for Asia's Oil and Gas companies align with Resource Dependence Theory, Institutional Theory, Legitimacy Theory, and Agency Theory. Managers can optimize sustainability strategies by focusing on board structures, diversity, recognized reporting standards, and reputable auditors. The study emphasizes the importance of transparent reporting practices, diverse board perspectives, and aligning with global standards for enhanced credibility. While audit firm selection may not be decisive for sustainability performance, strategic board optimizations, gender diversity, and adherence to recognized standards are crucial for navigating the dynamic business landscape in Asia.

7.4.3 For Europe

The theoretical implications for European Oil and Gas companies highlight alignment with Resource Dependence Theory, Agency Theory, Legitimacy Theory, and Institutional Theory. Managers are advised to carefully assess board structures, emphasizing independence and avoiding CEO duality. Adoption of recognized reporting standards and engagement with reputable auditors can enhance credibility. The study underscores the potential synergy between sustainability reporting and gender-diverse boards. A comprehensive and strategic approach to sustainability management, considering nuanced dynamics, is recommended for meeting stakeholder expectations in the European Oil and Gas sector.

7.4.4 For Oceania

The theoretical implications for Oceania's Oil and Gas sector emphasize the influence of Resource-Based View, Institutional Theory, and Agency Theory on sustainability performance. Managers are encouraged to optimize board structures, foster diversity, and adhere to recognized reporting standards. While Big4 auditors positively impact sustainability, a nuanced approach is required for board committee structures. The managerial implications stress the importance of aligning organizational structures, reporting practices, and governance mechanisms to enhance sustainability performance in Oceania, acknowledging the contextual dynamics of the region.

7.4 Summary of Conclusion on Hypothesis

In summary we make the following conclusion based on the study result and proposed hypothesis. We fail to reject H_{1B}, H_{2B}, H_{3B}, H_{4B}, H_{5B}, H_{6B}, H_{7B}, H_{8B}, H_{12B}, and H_{13B} because the study findings show significant a-priori signs, and we reject H_{9B}, H_{10B}, H_{11}, H_{18}, H_{19}, H_{20}, H_{21}, H_{22}, H_{23}, and H_{24}, because the study findings were not significant or did not show the a-priori signs.

For the American O&G companies, we fail to reject H_{1B}, H_{2B}, H_{3B}, H_{4B}, H_{5B}, H_{6B}, H_{7B}, H_{12B}, and H_{19} because the study findings show significant a-priori signs, and we reject H_{8B}, H_{9B}, H_{10B}, H_{11B}, H_{13B}, H_{18}, H_{20}, H_{21}, H_{22}, H_{23}, and H_{24} because the study findings were not significant or did not show the a-priori signs.

For the Asian O&G companies, we fail to reject H_{1B}, H_{2B}, H_{3B}, H_{4B}, H_{5B}, H_{8B}, H_{12B}, H_{13B}, H_{18}, and H_{21} because the study findings show significant a-priori signs, and we reject H_{6B}, H_{7B}, H_{9B}, H_{10B}, H_{11B}, H_{19}, H_{20}, H_{22}, H_{23}, and H_{24} because the study findings were not significant or did not show the a-priori signs.

For the European O&G companies, we fail to reject H_{5B}, H_{7B}, H_{12B}, H_{13B}, H_{13}, H_{17B}, and H_{21B}, because the study findings show significant a-priori signs, and we reject H_{1B}, H_{2B}, H_{3B}, H_{4B}, H_{6B}, H_{8B}, H_{9B}, H_{10B}, , H_{11}, H_{19}, H_{21}, H_{22}, H_{23}, and H_{24}, because the study findings were not significant or did not show the a-priori signs.

For the Oceanian O&G companies, we fail to reject H_{2B}, H_{7B}, H_{8B}, H_{12B}, H_{13B}, H_{19}, H_{21}, H_{22}, and H_{24} because the study findings show a-priori signs, and we reject H_{1B}, H_{3B}, H_{4B}, H_{5B}, H_{9B}, H_{10B}, H_{11}, H_{18}, H_{20}, and H_{23} because the study findings were not significant or did not show the a-priori signs.

Chapter Eight

Results and Discussion: Explained Differences in Sustainability Performance

8.1 Introduction

This chapter presents the results for the decomposition performed by the Blinder-Oaxaca approach and discusses the resulting findings. First, the two-sample independent t-test for group differences is conducted to confirm the existence of significance difference in sustainability performance (ESG score) between the two groups. Ones the difference is confirmed, the decomposition analysis is presented to examine the effect of the predictor variables on the differences in ESG scores.

8.2 Results: Test for Mean Differences in ESG score (Sustainability Performance)

Table 55 show the results from the pre-test (independent test for mean differences) between pairs of regions. The analysis of four regional means consisting of sets of two produces six different analyses of the mean differences. This are Asia-Americas, Europe-Americas, America-Oceania, Europe-Asia, Asia-Oceania, and Europe-Oceania.

Careful examination of the table indicates significant difference in mean ESG scores for all the pairs of groups under comparism. The comparism between Oil and Gas companies in Europe and Asia was the least significant, showing 10% level of significance in mean ESG scores. [M=2.98; t(df)=1.63(566); 95% C.I (-0.62, 6.58)]. Hence, we present and discuss the decomposition results for all 6 set of groups. The comparison between Europe and Oceania shows the largest mean difference in ESG score of 26.21 in favour of O&G companies in Europe. This is followed by 23.23 in favour of Asia in (Asia vs Oceania) comparison.

Table 55: Independent Two-Sample Test for Differences in Mean ESG Scores

Groups	Mean Difference	t (df)	[95% C.I]	
			Lower	Upper
Asia vs Americas	14.23***	9.54 (886)	11.30	17.15
Europe vs Americas	17.21***	11.04 (894)	14.15	20.27
Americas vs Oceania	9.01***	4.38 (726)	4.97	13.04
Europe vs Asia	2.98*	1.63 (566)	-0.62	6.58
Asia vs Oceania	23.23***	10.88 (398)	19.03	27.43
Europe vs Oceania	26.21***	10.88 (406)	21.48	30.95

***, & * denote 1% & 10% level of significance respectively

8.3 Decomposition Results: Explained Differences in Sustainability Performance

This section presents the results for the Blinder-Oaxaca decomposition analysis for the differences in sustainability performance into explained and unexplained differences Table 56 to Table 61 show the result for six different pairs of regional comparism of ESG performance for the O&G companies, under two different models. Model M1 with no control for firm characteristics and industry fixed effect, and model M2 which accounts for firm controls and industry fixed effects. Only the explained part of the total difference is presented for our analysis. The unexplained portion according to the Oaxaca approach can be attributable to unobserved characteristics which may include omitted variables. For policy recommendation purposes, we focused only on the explained portion as shown in the tables below.

8.3.1 Explained Differences in ESG Performance between Americas and Asia

The decomposition result for differences in sustainability performance between O&G companies in the Americas and Asia is presented in Table 56. It shows the coefficients, the standard deviations and the 95% confidence intervals (C.I). The last row section of the table show the differences and the partitioning. A notable difference in mean ESG score (14.66, 95% CI: 11.44 – 17.88)[9]. is reported in favour of O&G companies in Asia out of which 11.08 units (approximately 75%) are explained by differences in the observed characteristics (predictor variables) of the companies in the two regions.

The differences in reporting status, board size, quality of external auditors, and adoption of GRI guidelines contributed to the widening of the gap in sustainability performance between O&G companies from the two regions in both models, M1 and M2. In M2 when we control for firm characteristics, the differences in firm size (SZ) showed significant positive effect on sustainability performance. In M1, the differences in companies that have all three committees is shown to contribute to the performance gap. The difference in companies that report relative to those that do not report contributes to 6.08 (53.57%) of the differences in sustainability performance. With a reported significant coefficient of –4.35, -1.66, -0.93, -0.68, and -0.40, the differences in BI, companies with only 1 board committee (Only_1), MandRpt, BGd, and EPS are shown to reduce the performance gap (differences in mean ESG scores) by approximately 38%, 15%, 8%, 6% and 4% respectively. This means that if O&G companies in the Americas were to have these observed predictors in the same proportions as the Asian companies, the predicted mean ESG score could rather increase.

In Table 56 CEOBm, Age, LEV, profitability (ROE), and Ind were not significant in both models. This means that these variables do not account for the explained differences in ESG scores between O&G companies in Asia and the Americas.

[9] The complete table with the z-scores, p-values and the 96% C.I is shown in the appendix

Table 56: Decomposition Results for O&G Companies - Asia & Americas

Variables	M1		M2	
	Coef.	Std. Error	Coef.	Std. Error
Sr (base=no): yes	6.08***	0.69	5.08***	0.6
COM (base=none):				
Only_1	-1.66***	0.61	-0.47	0.43
Two comm.	0.20	0.50	0.03	0.10
All 3 comm.	2.06**	0.89	0.01	0.77
Bsz	5.57***	0.79	2.67***	0.68
BGd	-0.68***	0.24	-0.38**	0.16
BI	-4.35***	1.02	-3.12***	0.97
CEOBM (base=no): yes	-0.15	0.11	-0.14	0.10
EPS (base=weak EP): strong EP	-0.40*	0.24	-0.36*	0.21
MandRpt (base=no): yes	-0.93***	0.29	-0.31	0.22
GRI (base=no): yes	1.90***	0.44	1.49***	0.37
AuQ (base=non-Top4): Top4	3.71***	0.77	1.55**	0.70
SZ			3.39***	0.5
Age			0.22	0.24
Age2			-0.01	0.04
LEV			-3.41	2.48
ROe			0.00	0.02
Ind (base=Oil&Gas_E&Ps):				
Oil&Gas_Integrated			-0.03	0.08
Oil&Gas_R&M			0.65	0.48
Group 1 = Asia	52.69***	1.40	52.69***	1.41
Group 2 = Americas	38.03***	0.85	38.03***	0.85
Difference	14.66***	1.64	14.66***	1.64
Explained gap	11.35***	1.87	6.88**	3.16
Unexplained gap	3.31*	1.77	7.78***	3.02
Observations	831		831	
Firm Control	no		yes	
Ind_FE	no		yes	

***, **, * denote 1%, 5%, & 10% level of sigfnificance respectively

8.3.2 Explained Differences in ESG Performance between Europe and Americas

In Table 57, the differences in mean predicted ESG score is confirmed. It is significant and in favour of O&G companies in Europe (18.24, 95% CI: 14.93 – 21.55). The columns present the coefficients (average contribution), standard errors, and 95% CI for each predictor to the explained regional differences in ESG scores. Approximately 13.45 units (approximately 74%) of the predicted difference is explained for by the observed differences between the O&G companies of the two regions, and the remaining 36% unexplained.

The most significant contributor to the explained differences in ESG performance between O&G companies in America and Europe in descending order of ranking is the differences in reporting status, consultation by Top4 auditing firms, board size, adoption of GRI guidelines, having all 3 board committees, board gender diversity, and CEO duality. These variables were also significant in M2, as well as the differences in the firm size and the differences in the industry composition of O&G integrated companies.

For instance, relative to non-reporting O&G companies, differences in companies that reports on sustainability contributes 7.36 (firm size contributes 4.99 units (55% = 7.36/18.24) of the explained differences while the differences in auditing by Top-4 external auditors, board size, the use of GRI guidelines, having all 3 board committees, board gender diversity, and number of CEOs serving as board accounts positively for approximately 40%, 25%, 17%, and 17%, 11% & 3% of the explained differences in predicted ESG score respectively.

Notably, predictor variables like board independence, mandatory reporting and policy stringency detract. They literally subtract from the explained differences. This means that, if O&G companies in the Americas had the same proportion of independent members on corporate boards as their European counterparts, that could increase the mean predicted differences in sustainability performance (ESG score) between the two groups rather than decrease it. Accounting for firm control and industry fixed effects, we found COM and MandRpt to be the only insignificant predictors.

Table 57: Decomposition Results for O&G Companies Europe & Americas

Variables	M1		M2	
	Coef.	Std. Error	Coef.	Std. Error
Sr (base=no): yes	7.36***	0.68	6.14***	0.60
COM (base=none):				
Only_1	-1.43***	0.54	-0.41	0.37
Two comm.	-1.92***	0.73	-0.33	0.54
All 3 comm.	2.29**	0.96	0.01	0.86
Bsz	3.38***	0.58	1.62***	0.44
BGd	1.49***	0.40	0.82***	0.31
BI	-2.66***	0.65	-1.91***	0.61
CEOBM (base=no): yes	0.35**	0.18	0.31**	0.16
EPS (base=weak EP): strong EP	-0.41*	0.24	-0.36*	0.21
MandRpt (base=no): yes	-2.67***	0.64	-0.90	0.59
GRI (base=no): yes	2.32***	0.45	1.83***	0.38
AuQ (base=non-Top4): Top4	5.34***	1.03	2.24**	1.00
SZ			3.30***	0.58
Age			-0.03	0.09
Age2			-0.05	0.13
LEV			0.06	0.05
ROe			0.00	0.03
Ind (base=Oil&Gas_E&Ps):				
Oil&Gas_Integrated			1.36*	0.71
Oil&Gas_R&M			0.23	0.17
Group 1 = Europe	56.27***	1.46	56.27***	1.46
Group 2 = Americas	38.03***	0.85	38.03***	0.86
Difference	18.24***	1.69	18.24***	1.69
Explained gap	13.45***	1.94	13.94***	1.84
Unexplained gap	4.79***	1.63	4.30***	1.51
Observations	862		862	
Firm Control	no		yes	
Ind_FE	no		yes	

***, **, * denote 1%, 5%, & 10% level of sigfnificance respectively

8.3.3 Explained Differences in ESG Performance between Americas and Oceania

Table 58 presents the decomposition result for O&G companies in the Americas and Oceania. The difference in predicted mean ESG score of 8.24 between the two groups is found to be highly significant [95% CI: 4.31-12.17]. This difference comprises a decomposition of -2.48 units (-30.09%) explained difference and an unexplained portion of 10.72 units (130.09%). The negative gap in explained difference means that the less performing group (in this case, Oceania) have observable characteristics that causes a huge detract in the explained differences.

Table 58: Decomposition Results for O&G Companies - Americas & Oceania

Variables	M1		M2	
	Coef.	Std. Error	Coef.	Std. Error
Sr (base=no): yes	0.81*	0.48	0.19	0.34
COM (base=none):				
Only_1	0.19	1.10	0.00	0.00
Two comm.	-0.11	0.22	-0.04	0.19
All 3 comm.	0.00	0.00	2.15*	1.16
Bsz	6.72***	1.88	2.48	2.77
BGd	-2.17***	0.70	-1.85***	0.66
BI	0.45	0.34	0.51	0.37
CEOBM (base=no): yes	0.05	0.12	-0.02	0.08
EPS (base=weak EP): strong EP	-0.27	0.39	-0.35	0.39
MandRpt (base=no): yes	-7.77*	4.07	-7.23	10.17
GRI (base=no): yes	0.76	0.48	0.59	0.40
AuQ (base=non-Top4): Top4	-1.14*	0.59	-0.85	0.69
SZ			1.31	2.05
Age			-1.61	2.94
Age2			0.06	0.68
LEV			0.00	0.01
ROe			0.11	0.17
Ind (base=Oil&Gas_E&Ps):				
Oil&Gas_Integrated			-0.246	0.29
Oil&Gas_R&M			0.303	1.05
Group 1 = Americas	38.03***	0.85	38.03***	0.86
Group 2 = Oceania	29.79***	1.81	29.79***	1.83
Difference	8.24***	2.01	8.24***	2.02
Explained gap	-2.48	4.55	-4.50	10.73
Unexplained gap	10.72**	4.33	12.74	10.64
Observations	711		711	
Firm Control	no		yes	
Ind_FE	no		yes	

***, **, * denote 1%, 5%, & 10% level of sigfnificance respectively

For instance, there is a bridge in ESG performance between the two countries for MandRpt by 7.77 units (315%) and BGd by 2.17 units (87.5%) of the explained differences. In M2, we found that only BGd was significant predictor of the explained differences in sustainability performance between O&G companies from the two regions. BGd does not only explain 1.85 units (74.60%) of the explain gap, but also detract from the gap (as indicated by the negative coefficient). This is because, Oceania dominate in the proportion of observations in countries with mandated reporting (93.33% (112/120) against 24.84% (151/608) of the respective regional observations) in Table 22, and the proportion of women serving on board committees (18.88% against 13.52% on average for all firms, and 23.52% against 17.35% for companies that report on sustainability) in Table 20. Following from M5 (full model) in the panel regressions results of both regions in Table 50 and Table 53 for America and Oceania respectively, BGd was significant for both group but the effect on sustainability performance for Oceania is nearly 2.5 times more than that for the Americas (0.44 against 0.18).

While the mean difference in ESG score is considerably small for the two regions, O&G companies in Oceania has observable characteristics that can eliminate this difference, or better, change the narrative. In summary, while the differences in board size and sustainability reporting status contributes only 82% and 10% respectively to the total performance gap, the gap-reducing effect of the difference in MandRpt alone 7.77 unit (94%) outweighs the combined effect of the predictors that widens the performance gap. Other predictors like BGd, and AuQ (Top4) also has a narrowing effect on the performance gap.

8.3.4 Explained Differences in ESG Performance between Asia and Oceania

Table 59 presents the decomposition outcome between O&G companies in Asia and Oceania. Notably, we observe a performance gap of 22.90 units of which 9.38 (approximately 41%) is accounted for or explained by the differences in the observable characteristics between the O&G companies in Asia and Oceania. Asia scores 22.90 more in mean ESG, indicating superior performance over Oceania.

While differences in board size contributes majorly to the positive gap, differences in gender diversity subtract from the gap. The former accounts for 72% of the total gap and constitutes more than 100% of the explained difference. Also, differences in the adoption of GRI guideline accounts for 2.24 units (approximately 24%) of the explained gap while country regulation on reporting (MandRpt) subtracts -5.78 (approximately 62%). Accounting for firm controls and industry fixed effect, the explained differences in sustainability performance between O&G companies in the two regions becomes insignificant.

Table 59: Decomposition Results for O&G Companies - Asia & Oceania

Variables	M1		M2	
	Coef.	Std. Error	Coef.	Std. Error
Sr (base=no): yes	3.42***	1.19	0.78	1.39
COM (base=none):				
Only_1	0.12	0.71	0.00	0.00
Two comm.	-0.09	0.19	-0.03	0.15
All 3 comm.	0.00	0.00	0.13	0.47
Bsz	16.38***	4.42	6.04	6.73
BGd	-3.46***	0.90	-2.96***	0.89
BI	-3.38	2.10	-3.84*	2.26
CEOBM (base=no): yes	-0.07	0.14	0.02	0.10
EPS (base=weak EP): strong EP	-0.58	0.84	-0.75	0.82
MandRpt (base=no): yes	-5.77*	3.05	-5.37	7.57
GRI (base=no): yes	2.24***	0.78	1.74**	0.77
AuQ (base=non-Top4): Top4	0.57	0.40	0.42	0.40
SZ			2.06	3.21
Age			-0.57	1.15
Age2			0.10	1.18
LEV			0.54	4.93
ROe			0.14	0.22
Ind (base=Oil&Gas_E&Ps):				
Oil&Gas_Integrated			-0.29	0.33
Oil&Gas_R&M			2.23	7.62
Group 1 = Asia	52.69***	1.40	52.69***	1.41
Group 2 = Oceania	29.79***	1.81	29.79***	1.83
Difference	22.90***	2.29	22.90***	2.30
Explained gap	9.38*	5.48	0.40	8.02
Unexplained gap	13.53**	5.37	22.50***	7.95
Observations	342		342	
Firm Control	no		yes	
Ind_FE	no		yes	

***, **, * denote 1%, 5%, & 10% level of sigfnificance respectively

8.3.5 Explained Differences in ESG Performance between Europe and Asia

Table 60 presents the decomposition outcome between O&G companies in Asia and Oceania. Notably, we observe a performance gap of 22.90 units of which 9.38 (approximately 41%) is accounted for or explained by the differences in the observable characteristics between the O&G companies in Asia and Oceania. Asia scores 22.90 more in mean ESG, indicating superior performance over Oceania.

Table 60: Decomposition Results for O&G Companies - Europe & Asia

Variables	M1		M2	
	Coef.	Std. Error	Coef.	Std. Error
Sr (base=no): yes	1.21**	0.51	0.36	0.25
COM (base=none):				
Only_1	-0.11	0.25	-0.09	0.20
Two comm.	2.86***	0.88	1.75***	0.63
All 3 comm.	-0.38	0.69	-0.19	0.32
Bsz	0.59*	0.34	0.40	0.30
BGd	-1.70**	0.67	-1.85***	0.67
BI	4.03***	0.89	3.95***	0.86
CEOBM (base=no): yes	0.25	0.35	-0.14	0.33
EPS (base=weak EP): strong EP	-0.00	0.04	0.00	0.03
MandRpt (base=no): yes	-2.74***	0.68	-1.86***	0.62
GRI (base=no): yes	0.73	0.72	1.06	1.05
AuQ (base=non-Top4): Top4	0.82**	0.34	0.48*	0.25
SZ			-0.06	0.30
Age			-1.99	1.25
Age2			0.92	0.88
LEV			0.46	0.59
ROe			-0.13	0.35
Ind (base=Oil&Gas_E&Ps):				
Oil&Gas_Integrated			5.12***	1.28
Oil&Gas_R&M			-3.26***	0.71
Group 1 = Europe	56.27***	1.46	56.27***	1.46
Group 2 = Asia	52.69***	1.40	52.69***	1.41
Difference	3.58*	2.02	3.58*	2.02
Explained gap	5.58***	1.94	4.94*	2.63
Unexplained gap	-2.00	1.51	-1.36	2.09
Observations	493		493	
Firm Control	no		yes	
Ind_FE	no		yes	

***, **, * denote 1%, 5%, & 10% level of sigfnificance respectively

Differences in board independence is reported to significantly account for a greater part (approximately 72%) of the explained differences in ESG performance between the O&G firms in the two regions. Difference in board committees within the O&G companies in the two regions also contributed significantly to the positive gap. differences in reporting status of the companies and their engagement of top auditing firms contributes to 34% and 23% of the explained mean difference in ESG performance respectively. The explained differences in sustainability performance between O&G companies in Europe and Asia is highly significant at 1% while the total difference is almost insignificant (10% level of significance and only 3.58-point difference in mean ESG scores).

8.3.6 Explained Differences in ESG Performance between Europe and Oceania

Table 61 show that 16.73 units which is approximately 63% of the difference in mean ESG score between O&G companies in Europe and those in Oceania is explained for. That is, that much of the difference is due to differences in the predictor variables between the two groups. For instance, a coefficient of 12.58 is an indication that about 75% of the explained difference in performance is as a result of the difference in the average board size between the two group.

In additional, relative to non-reporting O&G companies, 24% of the explained differences is as a result of the differences in companies that report on their sustainability outcomes. Also, approximately 15% and 8% of the explained differences in performance is accounted for by GRI and AuQ respectively. This means that the differences in the proportion of companies that adopt GRI and companies that employ the services of Top4 external auditors has an increasing effect on the mean ESG score between the two group, and the positive coefficient indicate that the difference is in favour of O&G companies in Europe.

However, differences in MandRpt reduces the performance gap between O&G companies in Oceania and Europe. Accounting for firm differences and industry fixed effects renders the explained differences insignificant. Nonetheless, the use of GRI remain a significant predictor of the overall differences in sustainability performance between O&G companies in the two regions.

Table 61: Decomposition Results for O&G Companies - Europe & Oceania

Variables	M1		M2	
	Coef.	Std. Error	Coef.	Std. Error
Sr (base=no): yes	3.96***	1.35	0.91	1.61
COM (base=none):				
Only_1	0.13	0.76	0.00	0.00
Two comm.	-0.33	0.64	-0.12	0.57
All 3 comm.	0.00	0.00	-0.20	0.45
Bsz	12.58***	3.44	4.64	5.18
BGd	0.66	0.71	0.57	0.62
BI	-1.90	1.20	-2.16*	1.29
CEOBM (base=no): yes	0.33	0.46	-0.11	0.47
EPS (base=weak EP): strong EP	-0.58	0.84	-0.75	0.82
MandRpt (base=no): yes	-2.03*	1.13	-1.89	2.68
GRI (base=no): yes	2.57***	0.85	1.99**	0.85
AuQ (base=non-Top4): Top4	1.33*	0.69	0.98	0.81
SZ			2.04	3.18
Age			-1.76	3.22
Age2			0.24	2.69
LEV			-0.01	0.09
ROe			0.14	0.22
Ind (base=Oil&Gas_E&Ps):				
Oil&Gas_Integrated			1.79	1.59
Oil&Gas_R&M			0.97	3.33
Group 1 = Europe	56.27***	1.46	56.27***	1.46
Group 2 = Oceania	29.78***	1.81	29.79***	1.83
Difference	26.48***	2.33	26.48***	2.34
Explained gap	16.73***	3.91	7.39	5.82
Unexplained gap	9.75***	3.62	19.09***	5.64
Observations	373		373	
Firm Control	no		yes	
Ind_FE	no		yes	

***, **, * denote 1%, 5%, & 10% level of sigfnificance respectively

8.4 Discussion of Results

The study results are presented and explained for each pair of regions under comparison. The study confirmed significant differences in sustainability performance using ESG scores as an indicator of sustainability performance. Firstly, highly significant differences in mean ESG score were found for all pairs of regional comparison between America and Asia (14.66 in favour of Asia), America and Europe (18.24 in favour of Europe), America and Oceania (8.24 in favour of Americas), Europe and Asia (3.58 in favour of Europe), Asia and Oceania (22.90 in favour of Asia), and Europe and Oceania (26.48 in favour of Europe). The mean difference in overall performance was significant for all pairs of comparism for both models, M1 and M2. Also, the explains difference was different for all except in M2 for a comparism between Asia and Oceania, and Europe and Oceania.

Although the highest difference in mean score was found between Europe and Oceania (26.21), the explained differences was highest between Europe and Oceania (16.73) for M1 and between Europe and Americas (13.94) for M2. This is because while Europe emerged as the region with O&G companies that scored highest on sustainability performance (highest ESG score) on average, the differences that were explained for and can be attributed to the differences observable characteristics was recorded in the Europe-Americas comparison in absolute term. In terms of proportion of explained to total differences, the Europe-Asia comparison reported the highest (5.58 / 3.58).

The differences in observable characteristics accounted for about 11.35 (77.42%) of the differences between Asia and Americas, 13.45 (73.74%) for America and Europe, -2.48 (-30.09%) for America and Oceania albeit insignificant, 5.58 (155.87%) for Europe and Asia, 9.38 (40.967%) for Asia and Oceania, and 16.73 (63.98%) for Europe and Oceania. Interestingly, while O&G companies in the Americas were the advantaged (8.24 total mean difference in mean ESG scores) in the Americas – Oceania analysis, the explained portion suggested that Oceania was at the advantage in term of differences in observable characteristics, hence the negative but insignificant explained differences in mean ESG score of -2.48. Although the effect of differences in board size adds to the overall gap, regulation on mandatory reporting (MandRpt) on sustainability was highest predictor on average. The MandRpt predictor was the largest contributors to the negative explained differences, and Oceania dominated in these aspects.

For the regional difference in sustainability performance between O&G companies in America and Asia, differences in observable characteristics such as sustainability reporting status, the size of corporate board, the use Top4 auditors, adoption of GRO guidelines, the number of board committees were the major contributors to the explained gap, while differences in proportion of independent board members, mandatory regulations, and the proportion of women on corporate boards were the major detractors. The implication is that, O&G companies in America can improve their sustainability performance in ESG scores in relation to Asia by improving the significant predictor of their sustainability performance, while taking cognizance of the predictors that adds to or detracts from explained gap.

The observable characteristics that contributed highly to the explained differences between America and Asia are the major contributor to the explained differences in average ESG score between America and Asia, likewise the detractors. Notably, O&G companies in the Americas, must focus on reducing the explained gap by either catching up on the aspect that they lag in or lack, and/or consciously build on the detractors. All this should be done in line with the predictors that significantly enhance their sustainability performance.

The differences in the contributors to the explained differences in sustainability performance between O&G companies in Asia and Oceania, and Europe and Oceania are the gender differences as a detractor in the case of Asia-Oceania. The differences in country regulation on mandatory reporting was a common detractor in both comparism. Aside these two variables, the differences in observable predictors like Bsz, Sr, and proportion of companies that adopt GRI guidelines were the contributors to the explained regional differences in both comparison where Oceanian O&G companies were the less performing group. This means that, if Oceanian O&G companies had the same proportion of these two factors as Europe and Asia, the differences in ESG score, hence, sustainability performance would bridge, especially for the board size (Bsz) which was a major 'contributor' (16.38 and 12.58 score points respectively in the case with Asia and Europe respectively) from the explained portion of the differences.

Between America and Oceania, although a total difference of 8.24 was reported, the explained portion was majorly accounted for by detracts. The factors to the explained difference were in favour of O&G companies in Oceania, hence, the -2.48 explained differences albeit the reported explained difference is insignificant. The intuition is that, although the O&G companies in the Americas dominated in terms of average mean ESG score, the difference in the observable characteristics were in favour of O&G companies in Oceania on average, hence, the negative coefficient of the explained gap.

Notably, the findings across all region comparisons indicate that firm-specific factors like Age, experience (Age^2), LEV, and ROE; board characteristics such as CEO duality (CEOBm) did not feature as important significant predictor of ESG performance differences. A summary of the contributors and detractors are presented in Table 62 for easy appreciation of how the O&G companies compare across sets of regions. It shows the explained differences and only the significant predictor of the explained performance differences.

From Table 62, the significant predictors of the explained differences suggests that the agency and stakeholder theory for the basis for explaining the differences in sustainability performance in the O&G operations across regions. Nonetheless, the signaling, legitimacy and institutional theories are important theories to explaining sustainability performance of O&G companies and between O&G companies across regions.

Table 62: Summary of Predictor Variables of Explained Regional Gaps in ESG Performance

Regions Compared	Factors to Explained Differences			
	Contributors		Subtracts	
Americas & Asia	Sr Bsz AuQ	All 3 comm. GRI SZ	Only_1 BGd BI	EPS MandRpt
Americas & Europe	Sr Bsz BGd CEOBm	All 3 comm GRIG AuQ SZ	Only_1 Two comm. BI	EPS MandRpt
Europe & Asia	Sr Two comm Bsz	BI AuQ	BGd	MandRpt
Asia & Oceania	Sr Bsz	GRI	BGd	MandRpt
Europe & Oceania	Sr Bsz	GRI AuQ	MandRpt	
Americas & Oceania	Sr	Bsz	BGd MandRpt	AuQ

Author's construction, 2023

Chapter Nine

Conclusion and Recommendations

9.1 Introduction

The previous chapters have introduced the motivation for the study, reviewed extant literature -both theory and empiric within the study concern, and provided a detail of the stud methodology which included the design, data, study variables, and the method of data analysis for each research question, presented the study results and discussed the findings. In this final chapter, we provide a summary of the study findings and discuss the conclusion, salient contributions to knowledge, and `the managerial and policy implications of the study. The study recommendations are presented together with some proposed future research ideas.

9.2 Restatement of Research Objectives

The main objective of this study is to investigate the dynamic relationship between sustainability reporting and performance, and examine if there is a significant difference in sustainability performance between O&G companies in the Americas, Asia, Europe, and Oceania, and to examine the determinants of the differences in corporate sustainability performance for the companies across the four regions. Following the motivation for this study, we specifically seek to:

1. Examine if sustainability performance significantly differs by reporting status.
2. Examine the effect of sustainability performance on sustainability reporting; and investigate the moderating effect of audit quality on the relationship
3. Examine the determinants of sustainability performance, and the role of corporate governance, mandatory reporting, and auditor quality in the effect of sustainability reporting on sustainability performance of O&G companies with sustainability reporting status as key predictor.
4. Investigate the explained differences in sustainability performance between O&G companies across regions.

9.3 Summary of Findings

First, the descriptive statistics revealed the following:

- O&G companies in Europe dominate in ESG scores and social pillar scores on average. O&G companies in Asia topped the environmental pillar scores followed by Europe, while the Americas reported the highest score for the governance pillar.
- The greater proportion of European observations (company year) reported on their sustainability. This was followed by Asia, America, then Oceania.

With the first objective of the study – to find out if reporting and non-reporting O&G companies across the four regions differ in sustainability performance, the study made interesting findings.

- First, a crosstabulation of company characteristics by reporting status was conducted for O&G companies separately in all four regions. The results indicated that reporting firms dominated in most of the firm characteristics. In summary, reporting firms were found to be averagely older, larger in size, and more profitable (ROE) than non-

reporting firms. All firms that engage the services of external auditors, either Top-4 or non-Top-4, report on the sustainability outcomes. The following major findings were made in relation to the first objective:

- Reporting O&G companies performed better than their non-reporting counterparts in all sustainability measures – ESG scores and all component scores (EnP, SoP, and GvP).
- Also, reporting firms did better in ESG controversies. The reported lower mean ESG controversy score compared to their non-reporting comparators, for all regions and the global panel.

In relation to research objective 2, the study found the following:

- Generally, O&G companies that performed well on their sustainability impacts, especially, EnP, GV and ESG have a high tendency or likelihood to report on their sustainability impacts. The case is true for O&G companies in all the regions, especially with regards to EnP.
- The number of board committees did not matter in O&G sustainability reporting generally, and for the regions.
- Except for O&G companies in Oceania, all companies with an audit committee are more likely to report on their sustainability impact. This is also true for the global panel.
- Interestingly, the stringency of general environmental policy was not significant predictor of sustainability reporting.
- Importantly, auditor quality has significant positive role in the relationship between EnP and Sr, and SoP and Sr, but mitigated the positive effect of ESG performance on Sr for the global panel. Similarly, auditing by top4 should significant positive effect on the relationship between ESG and Sr, and GvP and Sr.
- Specifically, the study reveals that Top4 auditors significantly impact sustainability reporting globally, providing a consistent influence across various indicators. In the Americas, 'other non-Top4' auditors play a notable role, challenging the dominance of Top4 auditors and urging managers to diversify auditor approaches. For Oceania, 'other non-Top4' auditors emerge as pivotal in influencing sustainability reporting dynamics, offering strategic insights for proactive sustainability approaches.

For research objective 3 – determinants of sustainability performance, the key findings included:

- Positive influence of sustainability reports on sustainability performance is evident globally and in regions except Europe. Europe's lack of significance is attributed to high voluntariness of reporting, making sustainability a conscious endeavor regardless of reporting status.
- Mandatory reporting insignificance rules out the argument of greenwashing, supporting the voluntary nature of sustainability practices.
- Governance indicators (number of board committees, Bsz, BGd, BI) align with agency and stakeholder theories, significantly impacting O&G companies globally.

- CEOBm lacks significance in predicting overall ESG performance, except for Europe where it negatively influences sustainability performance.
- Presence of diverse board committees positively correlates with sustainability performance, supporting agency and stakeholder theories.
- Interestingly, the institutional factors were not significant predictors of sustainability performance across O&G companies globally and in various regions – both stringency and mandatory reporting.
- Country-level regulations don't significantly influence sustainability performance, highlighting a potential disconnect between regulations and performance targets.
- Adoption of GRI guidelines positively influences sustainability performance globally and across regions. GRI's global adoption emphasizes its importance in identifying material sustainability issues, differentiating performers from non-performers.
- The use of external auditors was found to increase sustainability performance for the O&G companies globally and for all the regions. Especially, the services of Top-4 auditing firms is found to enhance sustainability performance all things being equal. Results align with agency, resource dependency, institutional, and stakeholder theories, supporting the role of large auditing firms in legitimizing corporate sustainability efforts.
- O&G E&P companies perform significantly less than integrated companies globally. E&P operations' environmental vulnerability may contribute to controversies, resulting in lower Environmental, Social, and Governance (ESG) performance.

For research objective 4 – determinants of explained differences in sustainability performance of O&G companies in the Americas, Asia, Europe, and Oceania.

- First, significant differences were found in sustainability performance between O&G companies in Americas and Asia
- O&G companies in Asia significantly performed better than their comparators in the Americas and Oceania in terms of mean ESG score.
- O&G companies in Europe significantly performed better than their comparators in the Americas and Oceania in terms of mean ESG score with majority of the differences accounted for by differences in their observable characteristics.
- O&G companies in the Americas performed better than their comparators in Oceania, but interestingly, the explained differences were in favour of the Oceania O&G companies.
- Sustainability reporting status of O&G companies was a key predictor of the explained differences in sustainability performance between O&G companies across all regional pairs.
- Corporate governance is a significant predictor of differences in the sustainability performance of O&G companies and between O&G companies across regions.
- Importantly, differences in the size of corporate boards, the adoption of GRI guidelines, and differences in the use of external auditor – particularly, the Top-4 auditing firms were significant contributory factors to the sustainability performance gap among O&G companies across the four regions – Americas, Asia, Europe, and Oceania.

9.4 Implications of Findings and Recommendations

9.4.1 Theoretical Implications

The findings of this study have important theoretical implications for the field of corporate sustainability reporting and performance, particularly within the context of the O&G industry. These implications contribute to advancing our theoretical understanding and provide valuable insights into the factors influencing sustainability practices. The following theoretical implications can be drawn from the study:

9.4.1.1 Theory of corporate sustainability reporting

The study confirms the positive association between sustainability reporting and sustainability performance in the O&G industry. Reporting companies consistently outperformed non-reporting firms in terms of ESG scores and various sustainability measures. This finding supports the legitimacy theory, suggesting that organizations engage in sustainability reporting to enhance their reputation and gain societal acceptance. It emphasizes the importance of transparency and accountability in driving sustainability performance.

9.4.1.2 Stakeholder theory and agency theory

The presence of adequate board committees positively influences sustainability reporting. Companies with more than two board committees focused on sustainability are more likely to respond to stakeholder pressures and expectations, resulting in increased sustainability reporting. This finding aligns with stakeholder theory, which emphasizes the role of stakeholder engagement in shaping organizational practices. Moreover, the positive relationship between corporate governance characteristics (such as board composition and committee structures) and sustainability performance supports agency theory, highlighting the importance of effective governance mechanisms in ensuring responsible business practices.

9.4.1.3 Signaling theory

Theoretical implications for signaling theory in the context of corporate sustainability reporting and performance were identified in this study. Reporting companies in the O&G industry consistently outperformed non-reporting firms in terms of sustainability measures. The findings suggest that sustainability reporting acts as a credible signal of a company's commitment to sustainability, enhancing its reputation and stakeholder perception. Furthermore, sustainability reporting can differentiate companies in the O&G industry and influence investor decision-making, attracting investments from those valuing sustainability-oriented firms. Overall, the study emphasizes the importance of understanding signaling theory in corporate sustainability reporting, its impact on stakeholders, competitive advantage, and investor behavior.

9.4.1.4 Legitimacy theory

The study found that companies adhering to GRI guidelines showed better sustainability performance compared to those that did not follow the guidelines, both for regional results and regional differences in sustainability performance. The implications of the study's findings on GRI guidelines and sustainability reporting for legitimacy theory are significant. Adherence to

GRI guidelines improves sustainability performance and enhances an organization's legitimacy by aligning with widely accepted reporting standards. It demonstrates transparency, accountability, and a commitment to responsible practices, which build stakeholder trust and confidence. By adopting these guidelines, organizations signal their willingness to conform to international norms, strengthening their legitimacy and reputation. The standardized framework provided by GRI guidelines ensures transparency and reliability in reporting, enabling stakeholders to better understand and trust the reported information. Overall, the study highlights the role of GRI guidelines in supporting organizations' legitimacy objectives and meeting societal expectations in sustainability reporting.

9.4.1.5 Institutional theory

The non-significant impact of mandatory reporting requirements on sustainability reporting suggests that regulatory pressures alone may not be sufficient to drive companies' sustainability practices. This finding challenges the assumptions of institutional theory, which posits that organizations conform to institutional norms and regulations. Instead, voluntary initiatives, such as the adoption of GRI guidelines, have a more significant influence on promoting sustainability reporting among O&G companies. It highlights the role of self-regulation and voluntary commitments in driving sustainability practices.

9.4.1.6 Resource dependency theory

The study demonstrates the importance of external auditors, particularly top-tier auditing firms according to the global panel, in enhancing sustainability performance. The involvement of reputable auditors contributes to the credibility and reliability of sustainability reports, thereby positively influencing company performance. This finding aligns with resource dependency theory, which suggests that organizations rely on external resources and expertise to overcome resource constraints and improve their performance. Contrary to theory, the external auditor quality was not important predictor of sustainability performance for O&G companies in Asia, Europe, and Oceania.

9.4.1.7 Regional differences and contextual factors

The observed variations in sustainability performance across regions underscore the influence of contextual factors on sustainability practices in the O&G industry. Factors such as corporate governance structures, board characteristics, the use of external auditors, and regional policies contribute to the differences in sustainability performance. This highlights the need to consider regional nuances and specific contextual factors when designing and implementing sustainability strategies. It emphasizes the importance of tailoring sustainability practices to local conditions and aligning them with regional priorities.

In conclusion, this study provides theoretical insights into the relationships between corporate sustainability reporting, performance, and various organizational factors within the industry. The findings contribute to existing theories, including legitimacy theory, stakeholder theory, agency theory, institutional theory, and resource dependency theory. They highlight the significance of company characteristics, governance structures, voluntary initiatives, and regional contextual factors in shaping sustainability practices. These theoretical implications

offer valuable guidance for academics, practitioners, and policymakers seeking to advance corporate sustainability in the O&G industry, facilitating more effective decision-making and the development of targeted interventions.

9.4.2 Managerial Implications

For O&G companies should recognize the true importance of sustainability reporting and promote its non-financial bottom lines. To promote sustainability reporting in O&G, companies must pay critical attention to different aspect of their operations and governance simultaneously.

Based on the findings of the study, there are several strong managerial and policy implications that can be drawn. The first implication is that O&G companies should prioritize sustainability reporting, as it was found to be positively associated with sustainability performance. This is particularly important for non-reporting companies, as they tend to perform worse than their reporting counterparts.

The managerial implications derived from the study highlight the strategic significance of selecting external auditors for Oil and Gas (O&G) companies, particularly in the Americas. The findings emphasize that O&G firms opting for 'other non-Top4' auditors exhibit a meaningful impact on sustainability reporting, showcasing higher reporting probabilities across various sustainability indicators. This suggests that a diversified approach in choosing auditors beyond the traditional Top4 can significantly contribute to the reporting landscape, underscoring the need for careful consideration in the selection process.

The study further underscores the nuanced effects of auditor choice on different sustainability indicators, offering guidance for aligning reporting strategies with specific environmental, social, and governance (ESG) performance areas. For O&G companies globally, the research emphasizes that Top4 auditors demonstrate a steadier and flatter impact across various sustainability indicators compared to 'other' auditors, supporting a positive performance-reporting nexus. This insight carries implications for companies aiming to enhance sustainability reporting, particularly at lower performance levels.

Additionally, the research sheds light on the potential impact of internal sustainability commitments, even in the absence of external auditors, indicating that strong internal practices can drive reporting practices. Therefore, managers should carefully evaluate the strategic alignment of sustainability goals with external audit engagements and leverage the findings to make informed decisions. The study contributes valuable insights for O&G managers, advocating for a proactive approach in sustainability reporting strategies and emphasizing the need for transparent communication about auditor choices and the role of 'other non-Top4' auditors to build stakeholder trust. Continuous monitoring of sustainability performance indicators is recommended for adapting reporting strategies based on evolving auditor dynamics.

9.4.3 Policy Implication

Based on the finding that mandatory reporting did not have a significant influence on sustainability reporting, it suggests that policies mandating sustainability reporting may not be the most effective means of improving sustainability performance in the O&G sector. Policymakers should consider refining regulations to ensure a more direct impact on sustainability outcomes rather than just reporting compliance. Instead, policy recommendations should focus on incentivizing companies to voluntarily report on their sustainability performance and encouraging the adoption of best practices. One approach could be to offer tax incentives or other financial benefits to companies that demonstrate strong sustainability performance. This could encourage companies to prioritize sustainability and invest in initiatives that improve their ESG scores.

Another policy recommendation could be to require companies to have a sustainability committee or other internal mechanism for overseeing and reporting on sustainability issues. This could ensure that sustainability is given adequate attention within the company and increase the likelihood of voluntary reporting.

Additionally, the positive influence of GRI guidelines on sustainability performance highlights their effectiveness as a policy tool. Policymakers could encourage the adoption of internationally recognized reporting frameworks such as the GRI guidelines. This could help to standardize reporting practices and make it easier for stakeholders to compare and evaluate the sustainability performance of different companies.

9.5 Conclusions

In conclusion, this comprehensive investigation into the determinants of sustainability performance in the Oil and Gas (O&G) sector has unearthed multifaceted insights with profound implications for theory, management, and policy. The study has found that reporting O&G companies perform better than their non-reporting counterparts in all sustainability measures. This has validated signaling theory, particularly evident in the positive association between sustainability reporting and performance, showcasing that O&G companies actively engaged in reporting outperform their non-reporting counterparts.

The exception of Europe, where voluntary reporting diminishes the predictive power of reporting status, sheds light on the region-specific dynamics of sustainability practices. This implies that while reporting is a powerful signal in certain contexts, the intentional and voluntary nature of sustainability efforts in Europe challenges traditional expectations. Additionally, corporate governance committee setup, CSR sustainability and Audit committees were found to be significant positive predictors of sustainability performance. The study also found that the use of GRI guideline and external auditors positively affect sustainability performance for O&G companies globally and in the various regions, except for Europe in the case of GRI guideline use. In addition, corporate governance and audit quality significantly moderate the relationship between sustainability reporting and sustainability performance.

Based on these findings, several managerial and policy implications have been drawn. rom a managerial standpoint, the findings underscore the pivotal role of corporate governance attributes in shaping sustainability outcomes. The positive influence of diverse board committees, board size, and the adoption of Global Reporting Initiative (GRI) guidelines highlights actionable strategies for O&G managers. Strategic decisions such as choosing reputable external auditors, especially Top-4 firms, are identified as crucial determinants of sustainability performance. Additionally, the disparity in performance between Exploration and Production (E&P) companies and integrated companies underscores the importance of tailoring sustainability strategies to address the specific environmental concerns associated with different operational models.

In conclusion, O&G companies should invest in sustainability reporting as it is associated with better sustainability performance. Corporate governance committees and sustainability committees should be set up and properly resourced to enhance sustainability performance. Companies should also adopt the GRI guideline and engage the services of external auditors, particularly Top-4 auditing firms, to improve sustainability performance. Policy makers should consider encouraging the adoption of these measures to enhance sustainability performance among O&G companies.

From a managerial standpoint, the findings underscore the pivotal role of corporate governance attributes in shaping sustainability outcomes. The positive influence of diverse board committees, board size, and the adoption of Global Reporting Initiative (GRI) guidelines highlights actionable strategies for O&G managers. Strategic decisions such as choosing reputable external auditors, especially Top-4 firms, are identified as crucial determinants of sustainability performance. Additionally, the disparity in performance between Exploration and Production (E&P) companies and integrated companies underscores the importance of tailoring sustainability strategies to address the specific environmental concerns associated with different operational models.

On the policy front, the study offers valuable recommendations for refining regulatory frameworks. Policymakers are encouraged to focus on ensuring that regulations directly impact sustainability outcomes rather than being solely compliance-oriented. Advocating for the adoption of global sustainability guidelines is proposed as a means to enhance industry-wide performance and facilitate meaningful cross-company comparisons. Overall, this research significantly contributes to the growing body of knowledge in sustainability within the O&G sector, providing actionable insights for various stakeholders navigating the complex landscape of environmental, social, and governance performance.

Overall, this study contributes to the literature on sustainability performance by examining the determinants of sustainability performance among O&G companies across different regions. The findings provide valuable insights for O&G companies and policy makers interested in enhancing sustainability performance.

9.6 Study limitations and Suggestions for Future Studies

There are several limitations to this study that need to be addressed. First, this study only focused on O&G companies and cannot be generalized to other industries. Second, the study used secondary data, which may be limited in terms of the variables that could be included. Third, the study did not consider cultural and institutional differences across regions. Fourth, the study only used one sustainability reporting standard (GRI) and did not account for variations in sustainability reporting standards.

More important is the issue of data availability. Secondary data on sustainability reporting and performance of O&G companies headquartered in African countries from our data source were unavailable, hence, the exclusion of Africa data from our study sample. Moreso, the data set had considerable missing values for non-financial variables like sustainability reporting for the year under study. This meant that exclusion of companies with missing values on sustainability reporting for 6 or more years. In addition, the missing values, especially on categorical variables restricted the extent of analysis. These limitations affect the generalizability of our result. Nonetheless, the study findings provide valuable foundation for policy rethinking, and for strategic corporate decisions on sustainability based on lessons from region leaders in O&G sustainability.

To address the limitations of this study, future research could consider the following:

- Expand the sample to other industries and compare the sustainability performance of different industries using the same methodology.
- Conduct a longitudinal study to investigate the changes in sustainability performance and reporting practices over time.
- Consider the cultural differences and differences in social pressure across regions in the analysis.
- Compare the effectiveness of different sustainability reporting standards in promoting sustainability performance.
- Investigate the impact of regulatory frameworks on sustainability reporting and performance.
- Investigate the role of external stakeholders, such as customers, suppliers, and NGOs, in promoting sustainability performance.
- Conduct qualitative research to gain a deeper understanding of the factors that influence sustainability reporting and performance.

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Appendix

Appendix A: List if countries of headquarters & number of O&G companies by regions

Table A1: List of countries and number of O&G companies by region

Americas	
Countries	# of Comp
Argentina	3
Bermuda	1
Brazil	5
Canada	15
Chile	1
Colombia	2
United States of America	49
	76

Asia	
Countries	# of Comp
China	5
India	7
Indonesia	1
Israel	1
Japan	6
Korea; Republic (S. Korea)	2
Malaysia	1
Pakistan	1
Qatar	1
Taiwan	1
Thailand	7
Turkey	1
	34

European	
Countries	# of Comp
Austria	1
Finland	1
France	3
Greece	2
Hungary	1
Italy	2
Norway	3
Poland	1
Portugal	1
Romania	1
Russia	7
Spain	1
United Kingdom	12
	36

Oceania	
Countries	# of Comp
Australia	14
New Zealand	1
	15

Appendix B: Panel statistics of study data for key variables

Table A2: Panel statistics for ESG score and component scores

Variable		Mean	Std. Dev.	Min	Max		Obs.
ESGS	overall	43.81	22.99	1.86	92.89	N =	1288
	between		22.25	2.21	88.56	n =	161
	within		6.00	16.60	73.80	T =	8
ESGCVS	overall	89.02	24.67	0.79	100.00	N =	1288
	between		19.52	5.11	100.00	n =	161
	within		15.16	10.13	157.24	T =	8
ESGCS	overall	41.24	20.73	1.86	87.82	N =	1288
	between		19.54	2.21	76.91	n =	161
	within		7.07	14.03	74.47	T =	8
EnPS	overall	38.12	27.78	0.00	93.85	N =	1288
	between		27.10	0.00	92.94	n =	161
	within		6.43	10.91	68.38	T =	8
SoPS	overall	43.68	26.39	0.41	95.57	N =	1288
	between		25.25	2.19	91.63	n =	161
	within		7.89	10.31	85.01	T =	8
GvPS	overall	52.39	23.98	0.87	98.55	N =	1288
	between		21.77	5.32	92.61	n =	161
	within		10.18	18.44	100.59	T =	8

Table A3: Panel statistics for Corporate Governance Committee setup

Region		Board Comm.		Sus Comm.		Aud. Comm.	
		Freq.	Percent	Freq.	Percent	Freq.	Percent
Overall	No	723	56.13	560	43.48	263	20.42
	Yes	565	43.87	728	56.52	1025	79.58
	Total	1288	100.00	1288	100.00	1288	100.00
				(n=161)			

Table A4: Panel statistics of board committee characteristics

Variable		Mean	Std. Dev.	Min	Max	Obs.
BSZ	overall	9.63	3.58	3.00	26.00	N = 1288
	between		3.42	3.00	22.25	n = 161
	within		1.10	3.83	15.38	T = 8
BGDv	overall	14.99	12.71	0.00	60.00	N = 1288
	between		11.04	0.00	48.31	n = 161
	within		6.35	-13.14	42.05	T = 8
Bindp	overall	59.52	24.51	0.00	100.00	N = 1288
	between		23.17	0.00	100.00	n = 161
	within		8.17	13.69	129.68	T = 8
CEOBMem	overall	0.64	0.48	0.00	1.00	N = 1288
	between		0.39	0.00	1.00	n = 161
	within		0.28	-0.23	1.52	T = 8

Table A5: Panel statistics for firm level controls

Variable		Mean	Std. Dev.	Min	Max	Obs.
Age	overall	32.15	25.55	4.00	139.00	1288
	between		25.52	7.50	135.50	161
	within		2.29	28.65	35.65	T = 8
Size	overall	22.23	2.31	10.65	26.74	1288
	between		2.28	15.10	26.68	161
	within		0.39	17.78	24.33	T = 8
ROE	overall	-0.10	1.92	-30.82	38.35	1288
	between		0.83	-7.23	4.03	161
	within		1.73	-26.44	34.22	T = 8
Lev	overall	1.06	3.35	0.00	56.08	1288
	between		2.08	0.00	18.54	161
	within		2.64	-15.41	46.96	T = 8

Table A6: Panel statistics for Mandatory reporting

MandRpt	Overall		Between		Within
	Freq.	Percent	Freq.	Percent	Percent
No	698	54.19	98	60.87	89.03
Yes	590	45.81	76	47.2	97.04
Total	1288	100	174	108.07	92.53
			(n=161)		

Appendix C: Global & regional panel regression results

Table A7: Panel Regression: Sr#corporate governance – Global Panel

ESG	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Sr : base No	0	.	.	.	.	.	
Yes	-3.596	5.021	-0.72	.474	-13.438	6.245	
COM: base None	0	.	.	.	.	.	
Only_1	2.01	3.886	0.52	.605	-5.606	9.627	
Two_Comm	6.323	4.056	1.56	.119	-1.627	14.272	
All_3	9.603	4.252	2.26	.024	1.27	17.935	**
Bsz	.043	.237	0.18	.856	-.421	.508	
BGd	.15	.043	3.47	.001	.065	.236	***
BI	.05	.033	1.53	.127	-.014	.114	
CEOBm : base No	0	.	.	.	.	.	
Yes	-.225	1.608	-0.14	.889	-3.377	2.927	
Yes	1.047	4.541	0.23	.818	-7.852	9.947	
Yes	1.289	4.61	0.28	.78	-7.745	10.324	
Yes	4.564	4.792	0.95	.341	-4.828	13.957	
Sr#co : base No	0	.	.	.	.	.	
Yes	.237	.241	0.98	.325	-.235	.709	
Sr#co : base No	0	.	.	.	.	.	
Yes	.013	.05	0.27	.79	-.085	.112	
Sr#co : base No	0	.	.	.	.	.	
Yes	.05	.035	1.44	.149	-.018	.118	
Sr#0b : base No	0	.	.	.	.	.	
Sr#1o : base No	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Yes	-.551	1.938	-0.28	.776	-4.349	3.247	
RECODE of EST : ba~P	0	.	.	.	.	.	
Strong_EP	-.545	.545	-1.00	.318	-1.613	.524	
: base No	0	.	.	.	.	.	
Yes	-1.35	1.171	-1.15	.249	-3.645	.944	
: base No	0	.	.	.	.	.	
Yes	15.969	1.492	10.70	0	13.044	18.894	***
RECODE of XX : bas~e	0	.	.	.	.	.	
Other	4.878	1.154	4.23	0	2.616	7.14	***
Top_4	7.605	1.216	6.25	0	5.221	9.988	***
SZ	1.241	.325	3.82	0	.604	1.877	***
Age	.067	.08	0.84	.398	-.089	.224	
Age2	0	.001	0.35	.723	-.001	.002	
LEV	-.005	.058	-0.08	.936	-.118	.108	
ROe	.083	.089	0.93	.35	-.091	.258	
2014b	0	.	.	.	.	.	
2015	1.262	.639	1.98	.048	.01	2.514	**
2016	1.42	.663	2.14	.032	.121	2.719	**
2017	.929	.674	1.38	.168	-.392	2.249	
2018	.796	.703	1.13	.258	-.583	2.174	
2019	1.039	.73	1.42	.155	-.392	2.471	
2020	2.252	.785	2.87	.004	.714	3.79	***
2021	3.987	.792	5.03	0	2.434	5.54	***
Regn : base Americas	0	.	.	.	.	.	
Asia	9.548	2.284	4.18	0	5.071	14.024	***
Europe	8.036	2.228	3.61	0	3.669	12.403	***
Oceania	-1.336	2.782	-0.48	.631	-6.789	4.117	
Ind : base Oil&Gas~s	0	.	.	.	.	.	
Oil&Gas_Integrated	9.905	2.849	3.48	.001	4.321	15.489	***
Oil&Gas_R&M	5.581	1.828	3.05	.002	1.998	9.164	***
Constant	-20.17	7.657	-2.63	.008	-35.177	-5.163	***

Mean dependent var	44.116	SD dependent var	23.260
Overall r-squared	0.797	Number of obs	1196
Chi-square	1317.015	Prob > chi2	0.000
R-squared within	0.328	R-squared between	0.833

**** p<.01, ** p<.05, * p<.1*

Table A8: Panel Regression: Sr#MandRpt – Global Panel

ESG	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Sr: base No	0	.	.	.	.	.	
Yes	4.138	.964	4.29	0	2.249	6.028	***
COM: base No	0	.	.	.	.	.	
Yes	-.934	1.608	-0.58	.561	-4.086	2.217	
Sr#0b : base No	0	.	.	.	.	.	
Sr#1o : base No	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Yes	-.561	1.344	-0.42	.677	-3.196	2.074	
: base None	0	.	.	.	.	.	
Only_1	2.419	1.923	1.26	.208	-1.35	6.187	
Two_Comm	6.533	2.071	3.15	.002	2.474	10.593	***
All_3	12.213	2.238	5.46	0	7.827	16.599	***
Bsz	.233	.135	1.73	.084	-.031	.497	*
BGd	.158	.026	5.96	0	.106	.21	***
BI	.091	.018	4.97	0	.055	.127	***
: base No	0	.	.	.	.	.	
Yes	-.825	1.096	-0.75	.452	-2.974	1.324	
RECODE of EST : ba~P	0	.	.	.	.	.	
Strong_EP	-.512	.547	-0.94	.349	-1.584	.56	
: base No	0	.	.	.	.	.	
Yes	15.683	1.496	10.48	0	12.751	18.616	***
RECODE of XX : bas~e	0	.	.	.	.	.	
Other	5.183	1.149	4.51	0	2.931	7.435	***
Top_4	8.025	1.198	6.70	0	5.677	10.374	***
SZ	1.191	.322	3.70	0	.559	1.823	***
Age	.065	.08	0.82	.413	-.091	.221	
Age2	0	.001	0.39	.697	-.001	.002	
LEV	-.01	.058	-0.17	.865	-.123	.103	
ROe	.087	.089	0.97	.331	-.088	.261	
2014b	0	.	.	.	.	.	
2015	1.304	.639	2.04	.041	.051	2.557	**
2016	1.451	.664	2.18	.029	.149	2.753	**
2017	.989	.675	1.47	.143	-.334	2.312	
2018	.896	.705	1.27	.203	-.485	2.277	
2019	1.117	.733	1.52	.127	-.319	2.553	
2020	2.333	.787	2.96	.003	.79	3.875	***
2021	4.116	.791	5.20	0	2.566	5.666	***
Regn : base Americas	0	.	.	.	.	.	
Asia	9.241	2.291	4.03	0	4.752	13.731	***
Europe	7.817	2.231	3.50	0	3.445	12.189	***
Oceania	-.998	2.803	-0.36	.722	-6.491	4.495	
Ind : base Oil&Gas~s	0	.	.	.	.	.	
Oil&Gas_Integrated	9.629	2.849	3.38	.001	4.045	15.214	***
Oil&Gas_R&M	5.564	1.833	3.04	.002	1.972	9.156	***
Constant	-24.01	7	-3.43	.001	-37.729	-10.29	***

Mean dependent var	44.116	SD dependent var	23.260
Overall r-squared	0.798	Number of obs	1196
Chi-square	1292.303	Prob > chi2	0.000
R-squared within	0.317	R-squared between	0.835

**** p<.01, ** p<.05, * p<.1*

Table A9: Panel Regression: Sr#AuQ – Global Panel

ESG	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Sr: base No	0	.	.	.	.	.	
Yes	2.258	.848	2.66	.008	.595	3.921	***
AuQ : bas~e	0	.	.	.	.	.	
Other	-4.234	2.159	-1.96	.05	-8.465	-.002	**
Top_4	6.903	2.698	2.56	.011	1.614	12.191	**
Sr#0b : base None	0	.	.	.	.	.	
Sr#1o : base None	0	.	.	.	.	.	
Sr#2o : base None	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Other	9.879	1.908	5.18	0	6.139	13.619	***
Other	1.327	2.59	0.51	.608	-3.749	6.403	
: base None	0	.	.	.	.	.	
Only_1	2.39	1.946	1.23	.22	-1.425	6.204	
Two_Comm	6.965	2.079	3.35	.001	2.891	11.039	***
All_3	12.451	2.236	5.57	0	8.069	16.834	***
Bsz	.194	.133	1.45	.147	-.068	.455	
BGd	.152	.026	5.82	0	.101	.204	***
BI	.09	.018	4.94	0	.054	.126	***
: base No	0	.	.	.	.	.	
Yes	-.82	1.088	-0.75	.451	-2.952	1.312	
RECODE of EST : ba~P	0	.	.	.	.	.	
Strong_EP	-.474	.542	-0.87	.382	-1.536	.589	
: base No	0	.	.	.	.	.	
Yes	-1.26	1.15	-1.10	.273	-3.513	.993	
: base No	0	.	.	.	.	.	
Yes	16.232	1.457	11.14	0	13.376	19.089	***
SZ	1.396	.318	4.38	0	.772	2.02	***
Age	.069	.077	0.90	.371	-.082	.221	
Age2	0	.001	0.34	.737	-.001	.002	
LEV	-.007	.057	-0.12	.908	-.119	.105	
ROe	.092	.089	1.04	.298	-.081	.266	
2014b	0	.	.	.	.	.	
2015	1.369	.635	2.16	.031	.124	2.614	**
2016	1.344	.66	2.04	.042	.05	2.637	**
2017	.811	.671	1.21	.227	-.504	2.126	
2018	.625	.7	0.89	.372	-.748	1.998	
2019	.881	.727	1.21	.226	-.545	2.307	
2020	2.254	.779	2.89	.004	.727	3.78	***
2021	4.06	.782	5.19	0	2.526	5.593	***
Regn : base Americas	0	.	.	.	.	.	
Asia	9.363	2.216	4.22	0	5.019	13.707	***
Europe	7.959	2.161	3.68	0	3.723	12.195	***
Oceania	-.721	2.693	-0.27	.789	-5.999	4.557	
Ind : base Oil&Gas~s	0	.	.	.	.	.	
Oil&Gas_Integrated	9.215	2.758	3.34	.001	3.811	14.62	***
Oil&Gas_R&M	5.296	1.772	2.99	.003	1.824	8.769	***
Constant	-27.334	6.933	-3.94	0	-40.923	-13.745	***

Mean dependent var	44.116	SD dependent var	23.260
Overall r-squared	0.801	Number of obs	1196
Chi-square	1385.518	Prob > chi2	0.000
R-squared within	0.334	R-squared between	0.837

**** p<.01, ** p<.05, * p<.1*

Table A10: Panel Regression: Sr#corporate governance – Americas

ESG	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Sr: base No	0	.	.	.	.	.	
Yes	15.269	9.254	1.65	.099	-2.867	33.406	*
COM: base None	0	.	.	.	.	.	
Only_1	2.637	5.767	0.46	.647	-8.666	13.94	
Two_Comm	11.308	6.193	1.83	.068	-.831	23.447	*
All_3	15.006	6.268	2.39	.017	2.721	27.291	**
Bsz	.057	.285	0.20	.842	-.503	.617	
BGd	.168	.054	3.08	.002	.061	.274	***
BI	.028	.048	0.59	.555	-.065	.122	
: base No	0	.	.	.	.	.	
Yes	1.094	1.803	0.61	.544	-2.439	4.628	
Sr#0b : base No	0	.	.	.	.	.	
Sr#1o : base No	0	.	.	.	.	.	
Sr#2o : base No	0	.	.	.	.	.	
Sr#3o : base No	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Yes	-5.804	7.723	-0.75	.452	-20.94	9.333	
Yes	-16.228	8.39	-1.93	.053	-32.672	.216	*
Yes	-12.767	8.495	-1.50	.133	-29.416	3.883	
Sr#co : base No	0	.	.	.	.	.	
Yes	.509	.314	1.62	.106	-.107	1.125	
Sr#co : base No	0	.	.	.	.	.	
Yes	.025	.067	0.37	.713	-.106	.155	
Sr#co : base No	0	.	.	.	.	.	
Yes	.039	.052	0.75	.452	-.062	.14	
Sr#0b : base No	0	.	.	.	.	.	
Sr#1o : base No	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Yes	-3.976	2.495	-1.59	.111	-8.866	.913	
RECODE of EST : ba~P	0	.	.	.	.	.	
Strong_EP	-.781	.711	-1.10	.272	-2.175	.613	
: base No	0	.	.	.	.	.	
Yes	-1.765	2.261	-0.78	.435	-6.197	2.666	
: base No	0	.	.	.	.	.	
Yes	14.046	1.977	7.10	0	10.171	17.922	***
RECODE of XX : bas~e	0	.	.	.	.	.	
Other	2.994	1.42	2.11	.035	.212	5.777	**
Top_4	4.843	2.146	2.26	.024	.637	9.048	**
SZ	1.56	.421	3.70	0	.734	2.385	***
Age	.101	.1	1.01	.313	-.095	.297	
Age2	0	.001	-0.06	.949	-.002	.001	
LEV	.002	.062	0.03	.978	-.119	.123	
ROe	.135	.095	1.42	.156	-.052	.322	
2014b	0	.	.	.	.	.	
2015	1.08	.879	1.23	.219	-.642	2.802	
2016	1.606	.939	1.71	.087	-.235	3.447	*
2017	.091	.942	0.10	.923	-1.755	1.937	
2018	-.129	.977	-0.13	.895	-2.044	1.786	
2019	.716	1.017	0.70	.481	-1.277	2.709	
2020	2.363	1.144	2.07	.039	.121	4.605	**
2021	4.397	1.14	3.86	0	2.162	6.632	***
Ind : base Oil&Gas~s	0	.	.	.	.	.	
Oil&Gas_Integrated	11.829	5.322	2.22	.026	1.398	22.26	**
Oil&Gas_R&M	4.226	2.414	1.75	.08	-.505	8.956	*
Constant	-30.89	10.505	-2.94	.003	-51.479	-10.301	***

Mean dependent var	38.029	SD dependent var	20.867
Overall r-squared	0.787	Number of obs	600
Chi-square	698.799	Prob > chi2	0.000
R-squared within	0.395	R-squared between	0.822

**** p<.01, ** p<.05, * p<.1*

Table A11: Panel Regression: Sr#MandRpt – Americas

ESG	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Sr: base No	0	.	.	.	.	.	
Yes	4.802	1.058	4.54	0	2.728	6.876	***
COM: base No	0	.	.	.	.	.	
Yes	-2.166	2.502	-0.87	.387	-7.069	2.738	
Sr#0b : base No	0	.	.	.	.	.	
Sr#1o : base No	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Yes	1.2	1.717	0.70	.485	-2.166	4.566	
: base None	0	.	.	.	.	.	
Only_1	-.065	3.717	-0.02	.986	-7.349	7.22	
Two_Comm	3.016	4.018	0.75	.453	-4.859	10.891	
All_3	8.547	4.124	2.07	.038	.464	16.63	**
Bsz	.365	.199	1.84	.066	-.024	.755	*
BGd	.174	.038	4.60	0	.1	.248	***
BI	.035	.028	1.25	.211	-.02	.089	
: base No	0	.	.	.	.	.	
Yes	-.525	1.446	-0.36	.717	-3.359	2.31	
RECODE of EST : ba~P	0	.	.	.	.	.	
Strong_EP	-.659	.722	-0.91	.361	-2.075	.756	
: base No	0	.	.	.	.	.	
Yes	14.415	1.964	7.34	0	10.565	18.264	***
RECODE of XX : bas~e	0	.	.	.	.	.	
Other	3.211	1.423	2.26	.024	.422	6	**
Top_4	5.387	2.146	2.51	.012	1.181	9.593	**
SZ	1.581	.418	3.78	0	.762	2.399	***
Age	.139	.098	1.42	.156	-.053	.331	
Age2	0	.001	-0.30	.764	-.002	.001	
LEV	-.013	.062	-0.21	.83	-.136	.109	
ROe	.14	.097	1.45	.148	-.05	.329	
2014b	0	.	.	.	.	.	
2015	1.265	.885	1.43	.153	-.469	3	
2016	1.619	.951	1.70	.088	-.244	3.482	*
2017	.028	.953	0.03	.977	-1.84	1.896	
2018	-.121	.989	-0.12	.903	-2.06	1.818	
2019	.767	1.028	0.75	.455	-1.247	2.781	
2020	2.395	1.152	2.08	.038	.137	4.652	**
2021	4.155	1.141	3.64	0	1.919	6.392	***
Ind : base Oil&Gas~s	0	.	.	.	.	.	
Oil&Gas_Integrated	10.048	5.211	1.93	.054	-.166	20.261	*
Oil&Gas_R&M	3.865	2.365	1.63	.102	-.77	8.5	
Constant	-26.358	9.342	-2.82	.005	-44.668	-8.049	***

Mean dependent var	38.029	SD dependent var	20.867
Overall r-squared	0.775	Number of obs	600
Chi-square	685.427	Prob > chi2	0.000
R-squared within	0.381	R-squared between	0.810

**** p<.01, ** p<.05, * p<.1*

Table A12: Panel Regression: Sr#AuQ – Americas

ESG	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Sr: base No	0	.	.	.	.	.	
Yes	3.055	.987	3.10	.002	1.12	4.989	***
AuQ : bas~e	0	.	.	.	.	.	
Other	-5.441	2.243	-2.42	.015	-9.838	-1.044	**
Top_4	5.749	2.106	2.73	.006	1.621	9.876	***
Sr#0b : base None	0	.	.	.	.	.	
Sr#1o : base None	0	.	.	.	.	.	
Sr#2o : base None	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Other	9.401	1.907	4.93	0	5.663	13.138	***
1o	0	.	.	.	.	.	
: base None	0	.	.	.	.	.	
Only_1	-.336	3.641	-0.09	.926	-7.472	6.8	
Two_Comm	3.699	3.932	0.94	.347	-4.008	11.406	
All_3	8.817	4.035	2.19	.029	.908	16.726	**
Bsz	.297	.195	1.52	.128	-.085	.68	
BGd	.164	.037	4.43	0	.092	.237	***
BI	.03	.027	1.11	.267	-.023	.083	
: base No	0	.	.	.	.	.	
Yes	-.69	1.417	-0.49	.626	-3.468	2.088	
RECODE of EST : ba~P	0	.	.	.	.	.	
Strong_EP	-.631	.704	-0.90	.37	-2.012	.749	
: base No	0	.	.	.	.	.	
Yes	-1.352	2.143	-0.63	.528	-5.553	2.849	
: base No	0	.	.	.	.	.	
Yes	15.377	1.907	8.06	0	11.639	19.115	***
SZ	1.89	.41	4.61	0	1.086	2.695	***
Age	.151	.094	1.60	.109	-.034	.336	
Age2	0	.001	-0.48	.628	-.002	.001	
LEV	-.014	.061	-0.24	.814	-.135	.106	
ROe	.148	.095	1.56	.12	-.038	.334	
2014b	0	.	.	.	.	.	
2015	1.454	.871	1.67	.095	-.252	3.161	*
2016	1.569	.934	1.68	.093	-.263	3.4	*
2017	-.137	.937	-0.15	.883	-1.973	1.699	
2018	-.422	.973	-0.43	.664	-2.328	1.485	
2019	.455	1.011	0.45	.652	-1.525	2.436	
2020	2.459	1.129	2.18	.029	.247	4.671	**
2021	4.289	1.118	3.83	0	2.097	6.481	***
Ind : base Oil&Gas~s	0	.	.	.	.	.	
Oil&Gas_Integrated	9.628	5.01	1.92	.055	-.191	19.447	*
Oil&Gas_R&M	3.443	2.269	1.52	.129	-1.004	7.891	
Constant	-31.89	9.17	-3.48	.001	-49.863	-13.917	***

Mean dependent var	38.029	SD dependent var	20.867
Overall r-squared	0.781	Number of obs	600
Chi-square	.	Prob > chi2	.
R-squared within	0.409	R-squared between	0.815

**** p<.01, ** p<.05, * p<.1*

Table A13: Panel Regression: Sr#corporate governance – Asia

ESG	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Sr: base No	0	.	.	.	.	.	
Yes	-7.523	14.292	-0.53	.599	-35.535	20.488	
COM: base None	0	.	.	.	.	.	
Only_1	4.818	13.166	0.37	.714	-20.987	30.624	
Two_Comm	11.781	10.228	1.15	.249	-8.266	31.827	
All_3	8.831	3.572	2.47	.013	1.83	15.833	**
Bsz	-.435	1.387	-0.31	.754	-3.154	2.284	
BGd	-.136	.272	-0.50	.618	-.67	.398	
BI	.122	.141	0.87	.386	-.154	.397	
: base No	0	.	.	.	.	.	
Yes	2.347	3.741	0.63	.53	-4.986	9.679	
Sr#0b : base No	0	.	.	.	.	.	
Sr#1o : base No	0	.	.	.	.	.	
Sr#2o : base No	0	.	.	.	.	.	
Sr#3o : base No	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Yes	-.073	13.735	-0.01	.996	-26.994	26.847	
Yes	-2.043	10.505	-0.19	.846	-22.632	18.546	
1o	0	.	.	.	.	.	
Sr#co : base No	0	.	.	.	.	.	
Yes	.14	1.403	0.10	.921	-2.61	2.889	
Sr#co : base No	0	.	.	.	.	.	
Yes	.029	.288	0.10	.92	-.535	.593	
Sr#co : base No	0	.	.	.	.	.	
Yes	.186	.153	1.22	.224	-.114	.485	
Sr#0b : base No	0	.	.	.	.	.	
Sr#1o : base No	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
RECODE of EST : ba~P	0	.	.	.	.	.	
Strong_EP	-1.031	1.893	-0.55	.586	-4.741	2.679	
: base No	0	.	.	.	.	.	
Yes	-6.264	2.037	-3.08	.002	-10.256	-2.271	***
: base No	0	.	.	.	.	.	
Yes	25.071	3.795	6.61	0	17.633	32.51	***
RECODE of XX : bas~e	0	.	.	.	.	.	
Other	6.631	2.7	2.46	.014	1.34	11.923	**
Top_4	7.279	2.784	2.61	.009	1.822	12.737	***
SZ	1.938	.868	2.23	.026	.237	3.638	**
Age	.222	.214	1.04	.299	-.197	.64	
Age2	-.001	.003	-0.47	.637	-.006	.004	
LEV	-1.463	1.529	-0.96	.339	-4.46	1.534	
ROe	-15.721	5.966	-2.63	.008	-27.414	-4.028	***
2014b	0	.	.	.	.	.	
2015	3.928	1.988	1.98	.048	.03	7.825	**
2016	4.271	1.986	2.15	.032	.378	8.163	**
2017	5.554	2.071	2.68	.007	1.495	9.614	***
2018	4.146	2.038	2.03	.042	.151	8.14	**
2019	3.572	2.082	1.72	.086	-.509	7.652	*
2020	4.064	2.273	1.79	.074	-.39	8.519	*
2021	6.619	2.285	2.90	.004	2.142	11.097	***
Ind : base Oil&Gas~s	0	.	.	.	.	.	
Oil&Gas_Integrated	23.005	6.194	3.71	0	10.866	35.144	***
Oil&Gas_R&M	9.614	2.346	4.10	0	5.017	14.211	***
Constant	-34.869	24.164	-1.44	.149	-82.23	12.492	

Mean dependent var	53.347	SD dependent var	21.245
Overall r-squared	0.886	Number of obs	223
Chi-square	.	Prob > chi2	.
R-squared within	0.252	R-squared between	0.946

**** p<.01, ** p<.05, * p<.1*

Table A14: Panel Regression: Sr#MandRpt – Asia

ESG	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Sr: base No	0	.	.	.	.	.	
Yes	-12.013	5.15	-2.33	.02	-22.107	-1.918	**
COM: base No	0	.	.	.	.	.	
Yes	-10.165	5.278	-1.93	.054	-20.51	.179	*
Sr#0b : base No	0	.	.	.	.	.	
Sr#1o : base No	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Yes	5.983	5.453	1.10	.273	-4.704	16.67	
: base None	0	.	.	.	.	.	
Only_1	2.656	3.019	0.88	.379	-3.262	8.574	
Two_Comm	6.219	3.466	1.79	.073	-.574	13.013	*
All_3	10.753	4.435	2.42	.015	2.06	19.445	**
Bsz	-.26	.265	-0.98	.326	-.779	.259	
BGd	-.031	.081	-0.39	.7	-.189	.127	
BI	.229	.051	4.48	0	.129	.329	***
: base No	0	.	.	.	.	.	
Yes	6.641	3.449	1.93	.054	-.12	13.401	*
RECODE of EST : ba~P	0	.	.	.	.	.	
Strong_EP	-1.674	1.861	-0.90	.368	-5.323	1.974	
: base No	0	.	.	.	.	.	
Yes	30.021	5.442	5.52	0	19.355	40.688	***
RECODE of XX : bas~e	0	.	.	.	.	.	
Other	6.064	3.294	1.84	.066	-.391	12.52	*
Top_4	8.733	3.336	2.62	.009	2.195	15.272	***
SZ	1.097	1.237	0.89	.375	-1.328	3.523	
Age	-.084	.302	-0.28	.782	-.675	.508	
Age2	.002	.003	0.69	.493	-.004	.009	
LEV	-2.283	1.044	-2.19	.029	-4.33	-.236	**
ROe	-14.135	4.854	-2.91	.004	-23.648	-4.621	***
2014b	0	.	.	.	.	.	
2015	3.407	1.679	2.03	.042	.117	6.697	**
2016	3.62	1.713	2.11	.035	.263	6.977	**
2017	5.123	1.796	2.85	.004	1.604	8.643	***
2018	3.678	1.814	2.03	.043	.124	7.233	**
2019	3.348	1.898	1.76	.078	-.372	7.068	*
2020	4.507	2.083	2.16	.03	.424	8.59	**
2021	7.265	2.101	3.46	.001	3.147	11.383	***
Ind : base Oil&Gas~s	0	.	.	.	.	.	
Oil&Gas_Integrated	27.654	9.709	2.85	.004	8.625	46.683	***
Oil&Gas_R&M	10.588	3.959	2.67	.007	2.828	18.348	***
Constant	-12.048	29.708	-0.41	.685	-70.276	46.179	

Mean dependent var	53.347	SD dependent var	21.245
Overall r-squared	0.861	Number of obs	223
Chi-square	237.565	Prob > chi2	0.000
R-squared within	0.315	R-squared between	0.911

*** p<.01, ** p<.05, * p<.1

Table A15: Panel Regression: Sr#AuQ – Asia

ESG	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
: base No	0	.	.	.	.	.	
Yes	-4.998	4.33	-1.15	.248	-13.485	3.488	
RECODE of XX : bas~e	0	.	.	.	.	.	
Other	5.466	3.286	1.66	.096	-.975	11.906	*
Top_4	18.993	7.442	2.55	.011	4.408	33.579	**
Sr#0b : base None	0	.	.	.	.	.	
Sr#1o : base None	0	.	.	.	.	.	
Sr#2o : base None	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Other	-11.468	7.98	-1.44	.151	-27.109	4.173	
: base None	0	.	.	.	.	.	
Only_1	4.2	3.232	1.30	.194	-2.134	10.535	
Two_Comm	7.842	3.554	2.21	.027	.875	14.808	**
All_3	11.891	4.448	2.67	.008	3.174	20.609	***
Bsz	-.291	.259	-1.12	.261	-.798	.217	
BGd	-.028	.079	-0.35	.726	-.183	.127	
BI	.236	.051	4.66	0	.137	.335	***
: base No	0	.	.	.	.	.	
Yes	7.281	3.598	2.02	.043	.229	14.332	**
RECODE of EST : ba~P	0	.	.	.	.	.	
Strong_EP	-1.783	1.844	-0.97	.334	-5.396	1.831	
: base No	0	.	.	.	.	.	
Yes	-5.17	2.237	-2.31	.021	-9.554	-.786	**
: base No	0	.	.	.	.	.	
Yes	28.544	5.042	5.66	0	18.662	38.425	***
SZ	1.527	1.157	1.32	.187	-.74	3.793	
Age	-.035	.287	-0.12	.903	-.596	.527	
Age2	.002	.003	0.55	.584	-.005	.008	
LEV	-1.765	1.007	-1.75	.08	-3.739	.208	*
ROe	-13.644	4.815	-2.83	.005	-23.082	-4.207	***
2014b	0	.	.	.	.	.	
2015	3.445	1.686	2.04	.041	.141	6.749	**
2016	3.6	1.711	2.10	.035	.248	6.953	**
2017	5.058	1.787	2.83	.005	1.555	8.561	***
2018	3.598	1.802	2.00	.046	.067	7.129	**
2019	3.184	1.877	1.70	.09	-.494	6.863	*
2020	4.328	2.064	2.10	.036	.284	8.373	**
2021	6.827	2.075	3.29	.001	2.76	10.894	***
Ind : base Oil&Gas~s	0	.	.	.	.	.	
Oil&Gas_Integrated	25.031	8.798	2.85	.004	7.788	42.275	***
Oil&Gas_R&M	9.861	3.556	2.77	.006	2.891	16.831	***
Constant	-28.986	28.421	-1.02	.308	-84.691	26.718	

Mean dependent var	53.347	SD dependent var	21.245
Overall r-squared	0.863	Number of obs	223
Chi-square	.	Prob > chi2	.
R-squared within	0.318	R-squared between	0.913

*** p<.01, ** p<.05, * p<.1

Table A16: Panel Regression: Sr#corporate governance – Europe

ESG	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Sr: base No	0	.	.	.	.	.	
Yes	-29.446	20.579	-1.43	.152	-69.78	10.889	
COM: base None	0	.	.	.	.	.	
Only_1	70.688	74.151	0.95	.34	-74.645	216.021	
Two_Comm	8.24	5.739	1.44	.151	-3.008	19.488	
All_3	15.48	6.004	2.58	.01	3.711	27.248	**
Bsz	-.541	1.878	-0.29	.773	-4.222	3.14	
BGd	-.767	.251	-3.05	.002	-1.259	-.274	***
BI	-2.026	1.415	-1.43	.152	-4.8	.748	
: base No	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Sr#0b : base No	0	.	.	.	.	.	
Sr#1o : base No	0	.	.	.	.	.	
Sr#2o : base No	0	.	.	.	.	.	
Sr#3o : base No	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Yes	-70.27	74.425	-0.94	.345	-216.141	75.601	
1o	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Sr#co : base No	0	.	.	.	.	.	
Yes	.834	1.896	0.44	.66	-2.882	4.55	
Sr#co : base No	0	.	.	.	.	.	
Yes	1.025	.257	3.98	0	.52	1.529	***
Sr#co : base No	0	.	.	.	.	.	
Yes	2.056	1.416	1.45	.146	-.719	4.83	
Sr#0b : base No	0	.	.	.	.	.	
Sr#1o : base No	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Yes	-3.841	2.893	-1.33	.184	-9.511	1.829	
RECODE of EST : ba~P	0	.	.	.	.	.	
Strong_EP	1.731	3.155	0.55	.583	-4.452	7.914	
: base No	0	.	.	.	.	.	
Yes	-.244	2.041	-0.12	.905	-4.245	3.756	
: base No	0	.	.	.	.	.	
Yes	16.697	4.606	3.62	0	7.67	25.725	***
RECODE of XX : bas~e	0	.	.	.	.	.	
Other	6.111	2.916	2.10	.036	.395	11.826	**
Top_4	8.987	2.617	3.44	.001	3.859	14.116	***
SZ	1.816	.956	1.90	.057	-.057	3.689	*
Age	.242	.214	1.13	.258	-.177	.661	
Age2	-.002	.002	-0.93	.354	-.006	.002	
LEV	-.594	.263	-2.26	.024	-1.109	-.078	**
ROe	-4.802	1.34	-3.58	0	-7.428	-2.175	***
2014b	0	.	.	.	.	.	
2015	1.34	1.277	1.05	.294	-1.162	3.842	
2016	2.773	1.355	2.05	.041	.118	5.428	**
2017	1.961	1.399	1.40	.161	-.781	4.702	
2018	2.092	1.453	1.44	.15	-.756	4.939	
2019	.912	1.507	0.60	.545	-2.041	3.866	
2020	.646	1.569	0.41	.681	-2.429	3.72	
2021	2.928	1.705	1.72	.086	-.414	6.27	*
Ind : base Oil&Gas~s	0	.	.	.	.	.	
Oil&Gas_Integrated	7.58	5.73	1.32	.186	-3.65	18.811	
Oil&Gas_R&M	5.012	4.875	1.03	.304	-4.543	14.568	
o	0	.	.	.	.	.	

Mean dependent var	56.268	SD dependent var	23.452
Overall r-squared	0.848	Number of obs	262
Chi-square	.	Prob > chi2	.
R-squared within	0.418	R-squared between	0.879

*** p<.01, ** p<.05, * p<.1

Table A17: Panel Regression: Sr#MandRpt – Europe

ESG	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Sr: base No	0	.	.	.	.	.	
Yes	6.182	5.94	1.04	.298	-5.46	17.824	
COM: base No	0	.	.	.	.	.	
Yes	7.399	6.05	1.22	.221	-4.46	19.257	
Sr#0b : base No	0	.	.	.	.	.	
Sr#1o : base No	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Yes	-8.159	6.337	-1.29	.198	-20.579	4.261	
: base None	0	.	.	.	.	.	
Only_1	.521	5.658	0.09	.927	-10.568	11.61	
Two_Comm	7.751	5.857	1.32	.186	-3.729	19.23	
All_3	14.477	6.12	2.37	.018	2.481	26.473	**
Bsz	.33	.306	1.08	.28	-.269	.929	
BGd	.21	.054	3.88	0	.104	.315	***
BI	.038	.036	1.04	.297	-.033	.109	
: base No	0	.	.	.	.	.	
Yes	-4.996	3.001	-1.67	.096	-10.878	.886	*
RECODE of EST : ba~P	0	.	.	.	.	.	
Strong_EP	1.835	3.267	0.56	.574	-4.569	8.239	
: base No	0	.	.	.	.	.	
Yes	22.722	4.673	4.86	0	13.562	31.881	***
RECODE of XX : bas~e	0	.	.	.	.	.	
Other	6.531	3.005	2.17	.03	.64	12.421	**
Top_4	9.378	2.688	3.49	0	4.11	14.646	***
SZ	1.496	.991	1.51	.131	-.447	3.439	
Age	.093	.222	0.42	.675	-.342	.528	
Age2	0	.002	-0.24	.809	-.005	.004	
LEV	-.515	.269	-1.92	.055	-1.042	.011	*
ROe	-3.791	1.356	-2.79	.005	-6.449	-1.133	***
2014b	0	.	.	.	.	.	
2015	1.502	1.309	1.15	.251	-1.063	4.067	
2016	2.777	1.381	2.01	.044	.07	5.484	**
2017	2.337	1.43	1.63	.102	-.466	5.14	
2018	2.677	1.485	1.80	.071	-.234	5.588	*
2019	1.731	1.538	1.13	.26	-1.282	4.745	
2020	1.714	1.599	1.07	.284	-1.421	4.848	
2021	4.057	1.738	2.33	.02	.65	7.465	**
Ind : base Oil&Gas~s	0	.	.	.	.	.	
Oil&Gas_Integrated	6.083	6.042	1.01	.314	-5.759	17.925	
Oil&Gas_R&M	.8	5.087	0.16	.875	-9.17	10.771	
Constant	-28.245	21.944	-1.29	.198	-71.255	14.765	

Mean dependent var	56.268	SD dependent var	23.452
Overall r-squared	0.795	Number of obs	262
Chi-square	296.607	Prob > chi2	0.000
R-squared within	0.406	R-squared between	0.827

**** p<.01, ** p<.05, * p<.1*

Table A18: Panel Regression: Sr#AuQ – Europe

ESG	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
: base No	0	.	.	.	.	.	
Yes	-3.132	4.309	-0.73	.467	-11.577	5.313	
RECODE of XX : bas~e	0	.	.	.	.	.	
Other	6.688	3.028	2.21	.027	.753	12.624	**
Top_4	4.833	6.099	0.79	.428	-7.121	16.786	
Sr#0b : base None	0	.	.	.	.	.	
Sr#1o : base None	0	.	.	.	.	.	
Sr#2o : base None	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Other	4.679	5.721	0.82	.413	-6.533	15.892	
: base None	0	.	.	.	.	.	
Only_1	.493	5.665	0.09	.931	-10.61	11.597	
Two_Comm	7.924	5.876	1.35	.177	-3.592	19.441	
All_3	14.767	6.148	2.40	.016	2.716	26.817	**
Bsz	.301	.305	0.99	.324	-.297	.898	
BGd	.208	.054	3.84	0	.102	.314	***
BI	.036	.036	0.98	.327	-.036	.107	
: base No	0	.	.	.	.	.	
Yes	-5.039	3.012	-1.67	.094	-10.943	.864	*
RECODE of EST : ba~P	0	.	.	.	.	.	
Strong_EP	1.889	3.277	0.58	.564	-4.533	8.311	
: base No	0	.	.	.	.	.	
Yes	-.078	2.062	-0.04	.97	-4.12	3.964	
: base No	0	.	.	.	.	.	
Yes	22.832	4.707	4.85	0	13.607	32.057	***
SZ	1.472	.999	1.47	.141	-.486	3.43	
Age	.093	.223	0.42	.675	-.344	.531	
Age2	-.001	.002	-0.27	.789	-.005	.003	
LEV	-.521	.269	-1.94	.053	-1.049	.006	*
ROe	-3.89	1.355	-2.87	.004	-6.547	-1.233	***
2014b	0	.	.	.	.	.	
2015	1.352	1.304	1.04	.3	-1.203	3.908	
2016	2.78	1.385	2.01	.045	.066	5.494	**
2017	2.329	1.433	1.62	.104	-.48	5.139	
2018	2.567	1.488	1.73	.084	-.349	5.483	*
2019	1.632	1.541	1.06	.29	-1.389	4.653	
2020	1.63	1.602	1.02	.309	-1.509	4.77	
2021	3.995	1.743	2.29	.022	.579	7.411	**
Ind : base Oil&Gas~s	0	.	.	.	.	.	
Oil&Gas_Integrated	6.753	6.08	1.11	.267	-5.165	18.67	
Oil&Gas_R&M	1.217	5.116	0.24	.812	-8.811	11.245	
Constant	-19.058	22.106	-0.86	.389	-62.385	24.269	

Mean dependent var	56.268	SD dependent var	23.452
Overall r-squared	0.791	Number of obs	262
Chi-square	.	Prob > chi2	.
R-squared within	0.406	R-squared between	0.822

****p<.01, **p<.05, *p<.1*

Table A19: Panel Regression: Sr#corporate governance – Oceania

ESG	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Se: base No	0	.	.	.	.	.	
Yes	-60.094	13.499	-4.45	0	-86.552	-33.635	***
COM: base None	0	.	.	.	.	.	
Only_1	-.177	5.077	-0.04	.972	-10.128	9.774	
Two_Comm	1.687	4.683	0.36	.719	-7.491	10.865	
3o	0	.	.	.	.	.	
Bsz	-3.168	.994	-3.19	.001	-5.117	-1.219	***
BGd	.407	.08	5.11	0	.251	.564	***
BI	.12	.064	1.86	.063	-.006	.246	*
: base No	0	.	.	.	.	.	
Yes	-10.673	5.516	-1.94	.053	-21.483	.138	*
Sr#0b : base No	0	.	.	.	.	.	
Sr#1o : base No	0	.	.	.	.	.	
Sr#2o : base No	0	.	.	.	.	.	
Sr#3o : base No	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Yes	-.111	6.571	-0.02	.987	-12.991	12.768	
Yes	1.515	7.073	0.21	.83	-12.347	15.377	
1o	0	.	.	.	.	.	
Sr#co : base No	0	.	.	.	.	.	
Yes	5.955	1.236	4.82	0	3.532	8.378	***
Sr#co : base No	0	.	.	.	.	.	
Yes	-.127	.162	-0.78	.434	-.445	.191	
Sr#co : base No	0	.	.	.	.	.	
Yes	.283	.104	2.73	.006	.08	.486	***
Sr#0b : base No	0	.	.	.	.	.	
Sr#1o : base No	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Yes	13.462	5.497	2.45	.014	2.687	24.237	**
RECODE of EST : ba~P	0	.	.	.	.	.	
Strong_EP	9.615	5.412	1.78	.076	-.994	20.223	*
: base No	0	.	.	.	.	.	
Yes	-19.636	12.076	-1.63	.104	-43.304	4.033	
: base No	0	.	.	.	.	.	
Yes	1.177	1.823	0.65	.519	-2.397	4.75	
RECODE of XX : bas~e	0	.	.	.	.	.	
Other	15.734	4.3	3.66	0	7.305	24.162	***
Top_4	10.507	2.803	3.75	0	5.014	16	***
SZ	1.738	.729	2.38	.017	.31	3.166	**
Age	-.186	.294	-0.63	.526	-.763	.39	
Age2	.005	.004	1.13	.257	-.004	.013	
LEV	-.049	.153	-0.32	.751	-.348	.251	
ROe	-.021	.234	-0.09	.927	-.48	.437	
2014b	0	.	.	.	.	.	
2015	-.374	2.382	-0.16	.875	-5.042	4.294	
2016	-3.092	2.431	-1.27	.203	-7.856	1.673	
2017	-5.1	2.516	-2.03	.043	-10.032	-.169	**
2018	-13.013	5.541	-2.35	.019	-23.873	-2.152	**
2019	-11.76	5.711	-2.06	.039	-22.954	-.565	**
2020	-14.719	5.784	-2.54	.011	-26.054	-3.383	**
2021	-3.327	2.668	-1.25	.212	-8.555	1.902	
Ind : base Oil&Gas~s	0	.	.	.	.	.	
Oil&Gas_Integrated	-11.264	7.129	-1.58	.114	-25.236	2.708	
Oil&Gas_R&M	-17.294	12.556	-1.38	.168	-41.904	7.316	
Constant	20.198	16.209	1.25	.213	-11.571	51.968	

Mean dependent var	29.787	SD dependent var	18.883
Overall r-squared	0.926	Number of obs	111
Chi-square	.	Prob > chi2	.
R-squared within	0.487	R-squared between	0.991

*** p<.01, ** p<.05, * p<.1

Table A20: Panel Regression: Sr#MandRpt – Oceania

ESG	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Sr: base No	0	.	.	.	.	.	
Yes	-6.758	7.775	-0.87	.385	-21.997	8.482	
COM: base No	0	.	.	.	.	.	
Yes	-22.472	16.15	-1.39	.164	-54.126	9.182	
Sr#0b : base No	0	.	.	.	.	.	
Sr#1o : base No	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Yes	11.576	8.095	1.43	.153	-4.29	27.442	
: base None	0	.	.	.	.	.	
Only_1	-5.834	4.365	-1.34	.181	-14.389	2.721	
Two_Comm	-4.623	4.023	-1.15	.25	-12.508	3.261	
3o	0	.	.	.	.	.	
Bsz	-1.539	1.111	-1.39	.166	-3.717	.639	
BGd	.511	.091	5.61	0	.332	.689	***
BI	.209	.068	3.10	.002	.077	.342	***
: base No	0	.	.	.	.	.	
Yes	1.277	4.445	0.29	.774	-7.435	9.988	
RECODE of EST : ba~P	0	.	.	.	.	.	
Strong_EP	5.265	6.941	0.76	.448	-8.339	18.869	
: base No	0	.	.	.	.	.	
Yes	4.122	2.25	1.83	.067	-.289	8.532	*
RECODE of XX : bas~e	0	.	.	.	.	.	
Other	27.507	5.032	5.47	0	17.644	37.37	***
Top_4	13.731	3.458	3.97	0	6.952	20.509	***
SZ	.711	.857	0.83	.407	-.969	2.391	
Age	.027	.355	0.08	.939	-.669	.724	
Age2	.003	.005	0.65	.517	-.007	.014	
LEV	.055	.193	0.28	.775	-.323	.433	
ROe	.124	.29	0.43	.668	-.444	.692	
2014b	0	.	.	.	.	.	
2015	-.742	3.043	-0.24	.807	-6.706	5.221	
2016	-3.008	3.079	-0.98	.329	-9.043	3.027	
2017	-4.413	3.132	-1.41	.159	-10.551	1.725	
2018	-8.401	7.066	-1.19	.234	-22.25	5.448	
2019	-10.66	7.375	-1.45	.148	-25.115	3.795	
2020	-10.984	7.473	-1.47	.142	-25.631	3.664	
2021	-3.635	3.272	-1.11	.267	-10.047	2.777	
Ind : base Oil&Gas~s	0	.	.	.	.	.	
Oil&Gas_Integrated	1.711	6.24	0.27	.784	-10.519	13.941	
Oil&Gas_R&M	-16.377	14.032	-1.17	.243	-43.879	11.125	
Constant	15.516	19.141	0.81	.418	-22	53.031	

Mean dependent var	29.787	SD dependent var	18.883
Overall r-squared	0.871	Number of obs	111
Chi-square	.	Prob > chi2	.
R-squared within	0.424	R-squared between	0.941

*** p<.01, ** p<.05, * p<.1

Table A21: Panel Regression: Sr#AuQ – Oceania

ESG	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
: base No	0	.	.	.	.	.	
Yes	-.155	2.947	-0.05	.958	-5.931	5.62	
RECODE of XX : bas~e	0	.	.	.	.	.	
Other	28.667	4.586	6.25	0	19.679	37.655	***
Top_4	-3.705	4.894	-0.76	.449	-13.297	5.887	
Sr#0b : base None	0	.	.	.	.	.	
Sr#1o : base None	0	.	.	.	.	.	
Sr#2o : base None	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
1o	0	.	.	.	.	.	
Other	21.497	4.888	4.40	0	11.917	31.077	***
: base None	0	.	.	.	.	.	
Only_1	-6.543	3.983	-1.64	.1	-14.349	1.263	
Two_Comm	-6.043	3.584	-1.69	.092	-13.068	.982	*
3o	0	.	.	.	.	.	
Bsz	.129	.983	0.13	.895	-1.798	2.056	
BGd	.392	.086	4.58	0	.224	.56	***
BI	.139	.063	2.22	.026	.016	.262	**
: base No	0	.	.	.	.	.	
Yes	-1.942	4.017	-0.48	.629	-9.814	5.931	
RECODE of EST : ba~P	0	.	.	.	.	.	
Strong_EP	4.977	6.023	0.83	.409	-6.829	16.782	
: base No	0	.	.	.	.	.	
Yes	-11.587	13.488	-0.86	.39	-38.023	14.849	
: base No	0	.	.	.	.	.	
Yes	1.756	2.13	0.82	.41	-2.419	5.93	
SZ	.935	.781	1.20	.231	-.596	2.466	
Age	-.217	.329	-0.66	.51	-.862	.429	
Age2	.005	.005	1.02	.31	-.005	.014	
LEV	.026	.176	0.15	.881	-.318	.371	
ROe	.277	.262	1.05	.292	-.238	.791	
2014b	0	.	.	.	.	.	
2015	-.306	2.776	-0.11	.912	-5.746	5.134	
2016	-1.844	2.816	-0.66	.513	-7.363	3.676	
2017	-2.903	2.873	-1.01	.312	-8.534	2.728	
2018	-7.214	6.211	-1.16	.245	-19.388	4.96	
2019	-7.884	6.533	-1.21	.227	-20.688	4.92	
2020	-9.64	6.567	-1.47	.142	-22.511	3.23	
2021	-2.091	3.002	-0.70	.486	-7.975	3.794	
Ind : base Oil&Gas~s	0	.	.	.	.	.	
Oil&Gas_Integrated	2.902	5.54	0.52	.6	-7.956	13.761	
Oil&Gas_R&M	-11.702	12.416	-0.94	.346	-36.036	12.633	
Constant	9.007	16.794	0.54	.592	-23.908	41.923	

Mean dependent var	29.787	SD dependent var	18.883
Overall r-squared	0.893	Number of obs	111
Chi-square	.	Prob > chi2	.
R-squared within	0.451	R-squared between	0.962

*** p<.01, ** p<.05, * p<.1

Appendix D: Test of regional differences in ESG performance between O&G companies

Test between O&G companies Asia & Americas

Table A22: Mean differences in ESG between O&G companies in Asia & Americas

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% C.I]	
					Lower	Upper
Asia	272	52.433	1.212	19.990	50.046	54.819
Americas	608	37.687	0.849	20.945	36.018	39.355
combined	880	42.244	0.733	21.740	40.806	43.683
diff		14.746	1.507		11.789	17.703

diff = mean(Asia) - mean(Americas); t (df) = 9.7870 (878)

H_0: diff = 0; Ha: diff! = 0; pr (| T | > | t |) = 0.0000

Test between O&G companies Europe & Americas

Table A23: Mean difference in ESG between O&G companies in Europe & Americas

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% C.I]	
					Lower	Upper
Europe	288	54.895	1.385	23.508	52.169	57.622
Americas	608	37.687	0.849	20.945	36.018	39.355
combined	896	43.218	0.776	23.225	41.695	44.741
diff		17.209	1.559		14.148	20.269

diff = mean(Europe) - mean(Americas); t (df) = 11.0352 (894)

H0: diff = 0; Ha: diff! = 0; pr (| T | > | t |) = 0.0000

Test between O&G companies America & Oceania

Table A24: Mean difference in ESG between O&G companies in America & Oceania

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% C.I]	
					Lower	Upper
Americas	608	37.687	0.849	20.945	36.018	39.355
Oceania	120	28.681	1.696	18.579	25.323	32.039
combined	728	36.202	0.772	20.831	34.686	37.718
diff		9.005	2.055		4.970	13.040

diff = mean(Americas) - mean(Oceania); t (df) = 4.3816 (726)

H0: diff = 0; Ha: diff! = 0; pr (| T | > | t |) = 0.0000

Test between O&G companies Europe & Asia

Table A25: Mean difference in ESG between O&G companies in Europe & Asia

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% C.I]	
					Lower	Upper
Europe	288	54.895	1.385	23.508	52.169	57.622
Asia	272	52.433	1.212	19.990	50.046	54.819
combined	560	53.699	0.925	21.885	51.883	55.516
diff		2.463	1.849		-1.169	6.095

diff = mean(Europe) - mean(Asia); t (df) = 1.3319 (558)

H0: diff = 0; Ha: diff! = 0; pr (| T | > | t |) = 0.1834

Test between O&G companies Asia & Oceania

Table A26: Mean difference in ESG between O&G companies in Asia & Oceania

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% C.I]	
					Lower	Upper
Asia	272	52.433	1.212	19.990	50.046	54.819
Oceania	120	28.681	1.696	18.579	25.323	32.039
combined	392	45.162	1.132	22.409	42.937	47.387
diff		23.751	2.145		19.535	27.968

diff = mean(Asia) - mean(Oceania); t (df) = 11.0746 (390)

H0: diff = 0; Ha: diff! = 0; pr (| T | > | t |) = 0.0000

Test between O&G companies Europe & Oceania

Table A27: Mean difference in ESG between O&G companies in Europe & Oceania

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% C.I]	
					Lower	Upper
Europe	288	54.895	1.385	23.508	52.169	57.622
Oceania	120	28.681	1.696	18.579	25.323	32.039
combined	408	47.185	1.246	25.172	44.736	49.635
diff		26.214	2.410		21.477	30.951

diff = mean(Europe) - mean(Oceania); t (df) = 10.8791 (406)

H0: diff = 0; Ha: diff! = 0; pr (| T | > | t |) = 0.0000

Appendix E: Blinder-Oaxaca Decomposition of sustainability (ESG) performance

Blinder-Oaxaca decomposition result - the Americas and Asia

Blinder-Oaxaca decomposition result - Europe and Americas

Blinder-Oaxaca decomposition result - the Americas and Oceania

Blinder-Oaxaca decomposition result - Europe and Asia

Blinder-Oaxaca decomposition result - Asia and Oceania

Blinder-Oaxaca decomposition result - Europe and Oceani

Table A28: Mean Differences in ESG Performance - Asia & Americas

	Oaxaca 1				Oaxaca 2			
Variables	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
	Explained		Unexplained		Explained		Unexplained	
_ISr_1	6.24***	(0.69)	-1.43	(2.90)	5.21***	(0.60)	-14.79***	(3.11)
_ICOM_1	-1.76***	(0.63)	4.28***	(1.09)	-0.50	(0.45)	2.13**	(0.94)
_ICOM_2	0.40	(0.51)	12.76***	(2.22)	0.07	(0.14)	5.29***	(1.93)
_ICOM_3	2.03**	(0.88)	5.84***	(1.37)	0.01	(0.76)	1.56	(1.13)
Bsz	5.81***	(0.81)	-24.30***	(3.69)	2.78***	(0.71)	-12.50***	(3.33)
BGd	-0.81***	(0.25)	-4.57***	(0.95)	-0.45**	(0.18)	-2.88***	(0.87)
BI	-4.35***	(1.02)	7.07***	(2.31)	-3.12***	(0.98)	8.53***	(2.15)
_ICEOBm_1	-0.14	(0.11)	1.86	(2.91)	-0.12	(0.10)	1.85	(2.98)
_IEPS_1	-0.39*	(0.23)	0.32	(1.68)	-0.35*	(0.21)	1.34	(1.48)
_IMandRpt_1	-0.84***	(0.27)	-1.37	(0.87)	-0.28	(0.20)	-2.22***	(0.84)
_IGRIG_1	2.17***	(0.46)	6.17***	(2.07)	1.70***	(0.38)	15.05***	(2.31)
_IAuQ_1	3.86***	(0.80)	-2.20**	(0.97)	1.62**	(0.73)	-1.16	(0.97)
SZ					3.60***	(0.51)	6.97	(17.55)
Age					0.27	(0.28)	16.25**	(6.87)
Age2					-0.00	(0.03)	-7.97**	(3.93)
LEV					0.06	(0.05)	-2.08***	(0.72)
ROe					0.01	(0.04)	-1.16**	(0.53)
_IInd_2					-0.02	(0.08)	0.72**	(0.31)
_IInd_3					0.63	(0.47)	7.25***	(1.36)
overall								
group_1	53.35***	(1.43)	53.35***	(1.43)	53.35***	(1.43)	53.35***	(1.43)
group_2	38.03***	(0.85)	38.03***	(0.85)	38.03***	(0.85)	38.03***	(0.85)
difference	15.32***	(1.67)	15.32***	(1.67)	15.32***	(1.67)	15.32***	(1.67)
explained	12.21***	(1.88)	12.21***	(1.88)	11.12***	(1.78)	12.21***	(1.88)
unexplained	3.10*	(1.80)	3.10*	(1.80)	4.20**	(1.70)	3.10*	(1.80)
Constant			-1.32	(5.60)			-18.00	(18.37)
Observations	823		823		823		823	
Firm Control	No		No		YES		YES	
Ind_FE	NO		NO		YES		YES	

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Table A29: Mean Differences in ESG Performance - Europe & Americas

	Oaxaca 1				Oaxaca 2			
Variables	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
	Explained		Unexplained		Explained		Unexplained	
_ISr_1	7.359***	(0.680)	1.928	(3.441)	6.142***	(0.596)	1.952	(3.011)
_ICOM_1	-1.434***	(0.541)	2.163	(2.105)	-0.407	(0.373)	2.296	(1.830)
_ICOM_2	-1.917***	(0.730)	9.778	(7.095)	-0.327	(0.536)	11.125*	(6.164)
_ICOM_3	2.291**	(0.964)	2.316	(2.449)	0.007	(0.855)	3.422	(2.160)
Bsz	3.379***	(0.583)	-7.758**	(3.364)	1.619***	(0.442)	-5.945*	(3.234)
BGd	1.493***	(0.397)	0.667	(1.454)	0.823***	(0.305)	-2.056	(1.422)
BI	-2.663***	(0.652)	5.417**	(2.465)	-1.910***	(0.612)	3.968*	(2.294)
_ICEOBm_1	0.352**	(0.175)	4.135**	(2.017)	0.313**	(0.158)	2.260	(1.868)
_IEPS_1	-0.412*	(0.243)	1.302	(2.126)	-0.367*	(0.218)	4.001*	(2.082)
_IMandRpt_1	-2.669***	(0.637)	1.669	(1.857)	-0.899	(0.592)	2.775	(1.724)
_IGRIG_1	2.324***	(0.449)	10.100***	(1.879)	1.825***	(0.379)	8.097***	(1.731)
_IAuQ_1	5.343***	(1.030)	-2.056	(1.361)	2.241**	(1.000)	0.323	(1.337)
SZ					3.302***	(0.575)	39.355***	(14.812)
Age					-0.033	(0.093)	4.890	(3.498)
Age2					-0.048	(0.128)	-3.011*	(1.551)
LEV					0.063	(0.050)	-0.195	(0.325)
ROe					0.004	(0.026)	-0.028	(0.051)
_IInd_2					1.356*	(0.714)	-2.515**	(1.212)
_IInd_3					0.226	(0.174)	-1.023	(0.893)
overall								
group_1	56.268***	(1.456)	56.268***	(1.456)	56.268***	(1.457)	53.35***	(1.43)
group_2	38.029***	(0.854)	38.029***	(0.854)	38.029***	(0.855)	38.03***	(0.85)
difference	18.239***	(1.688)	18.239***	(1.688)	18.239***	(1.689)	15.32***	(1.67)
explained	13.446***	(1.944)	13.446***	(1.944)	13.931***	(1.840)	12.21***	(1.88)
unexplained	4.793***	(1.631)	4.793***	(1.631)	4.308***	(1.506)	3.10*	(1.80)
Constant			-24.868**	(12.274)			-65.384***	(17.228)
Observations	862		862		862		862	
Firm Control	No		No		YES		YES	
Ind_FE	NO		NO		YES		YES	

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Table A30: Mean Differences in ESG Performance – Americas & Oceania

	Oaxaca 1				Oaxaca 2			
Variables	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
	Explained		Unexplained		Explained		Unexplained	
_ISr_1	0.809*	(0.484)	5.621***	(1.541)	0.185	(0.340)	7.246***	(1.831)
_ICOM_1	0.188	(1.104)	-1.150**	(0.455)	0.000	(0.000)	-0.340	(0.301)
_ICOM_2	-0.109	(0.223)	-5.264**	(2.182)	-0.040	(0.190)	-0.765	(2.015)
_ICOM_3	0.000	(0.000)	-4.309**	(1.725)	2.145*	(1.161)	-4.231	(2.672)
Bsz	6.720***	(1.881)	-10.013	(6.490)	2.479	(2.769)	-2.191	(9.850)
BGd	-2.167***	(0.696)	-2.992**	(1.384)	-1.854***	(0.659)	-3.576**	(1.459)
BI	0.448	(0.341)	1.093	(5.425)	0.510	(0.374)	-2.611	(5.764)
_ICEOBm_1	0.053	(0.124)	-0.750	(3.938)	-0.017	(0.082)	-3.969	(4.067)
_IEPS_1	-0.268	(0.391)	-0.215	(1.184)	-0.346	(0.386)	0.102	(1.136)
_IMandRpt_1	-7.771*	(4.068)	-3.934***	(1.459)	-7.227	(10.173)	-2.918	(3.532)
_IGRIG_1	0.763	(0.476)	1.274	(1.439)	0.592	(0.402)	1.043	(1.498)
_IAuQ_1	-1.144*	(0.587)	0.302*	(0.167)	-0.847	(0.694)	0.043	(0.184)
SZ					1.310	(2.045)	47.777**	(22.153)
Age					-1.606	(2.938)	-5.280	(12.187)
Age2					0.058	(0.676)	1.159	(10.428)
LEV					0.000	(0.012)	-0.222	(0.303)
ROe					0.107	(0.172)	0.029	(0.056)
_IInd_2					-0.246	(0.293)	-0.103	(0.288)
_IInd_3					0.303	(1.047)	-0.618	(3.197)
overall								
group_1	38.029***	(0.854)	38.029***	(0.854)	38.029***	(0.855)	38.029***	(0.855)
group_2	29.787***	(1.814)	29.787***	(1.814)	29.787***	(1.825)	29.787***	(1.825)
difference	8.241***	(2.005)	8.241***	(2.005)	8.241***	(2.015)	8.241***	(2.015)
explained	-2.479	(4.548)	-2.479	(4.548)	-4.494	(10.733)	-4.494	(10.733)
unexplained	10.720**	(4.331)	10.720**	(4.331)	12.735	(10.638)	12.735	(10.638)
Constant			31.057***	(8.674)			-17.841	(20.366)
Observations	711		711		711		711	
Firm Control	No		No		YES		YES	
Ind_FE	NO		NO		YES		YES	

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Table A31: Mean Differences in ESG Performance – Europe & Asia

	Oaxaca 1				Oaxaca 2			
Variables	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
	Explained		Unexplained		Explained		Unexplained	
_ISr_1	1.017**	(0.489)	3.459	(4.334)	-0.095	(0.208)	17.772***	(4.227)
_ICOM_1	-0.147	(0.242)	-1.645	(2.028)	-0.143	(0.237)	0.401	(1.744)
_ICOM_2	3.022***	(0.895)	-8.321	(6.907)	1.818***	(0.644)	3.625	(5.952)
_ICOM_3	-0.413	(0.583)	-2.843	(2.414)	-0.181	(0.266)	2.041	(2.093)
Bsz	0.604	(0.372)	13.505***	(3.613)	0.396	(0.314)	4.991	(3.314)
BGd	-1.855**	(0.724)	9.394***	(1.874)	-1.355**	(0.683)	3.451*	(1.794)
BI	4.148***	(0.911)	-4.118	(3.338)	4.180***	(0.870)	-7.536**	(3.062)
_ICEOBm_1	0.239	(0.355)	2.529	(2.756)	0.185	(0.372)	0.661	(2.794)
_IEPS_1	-0.017	(0.057)	0.980	(2.495)	0.002	(0.023)	2.637	(2.367)
_IMandRpt_1	-3.029***	(0.727)	4.245**	(2.112)	-2.555***	(0.673)	6.933***	(1.977)
_IGRIG_1	0.272	(0.739)	3.806	(2.437)	0.411	(1.114)	-7.243***	(2.556)
_IAuQ_1	0.745**	(0.333)	0.885	(1.122)	0.233	(0.194)	1.872*	(1.043)
SZ					-0.333	(0.512)	32.417	(20.730)
Age					-3.183**	(1.532)	-8.484	(6.333)
Age2					1.398	(1.078)	3.513	(3.471)
LEV					-0.031	(0.337)	1.912**	(0.807)
ROe					0.996*	(0.529)	0.137	(0.231)
_IInd_2					6.780***	(1.391)	-8.636***	(1.765)
_IInd_3					-3.514***	(0.734)	-5.167***	(1.098)
overall								
group_1	56.268***	(1.456)	56.268***	(1.456)	56.268***	(1.457)	56.268***	(1.457)
group_2	53.347***	(1.430)	53.347***	(1.430)	53.347***	(1.431)	53.347***	(1.431)
difference	2.920	(2.041)	2.920	(2.041)	2.920	(2.042)	2.920	(2.042)
explained	4.588**	(2.006)	4.588**	(2.006)	5.009*	(2.818)	5.009*	(2.818)
unexplained	-1.668	(1.571)	-1.668	(1.571)	-2.088	(2.180)	-2.088	(2.180)
Constant			-23.544*	(12.334)			-47.384**	(23.218)
Observations	711		711		711		711	
Firm Control	No		No		YES		YES	
Ind_FE	NO		NO		YES		YES	

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Table A32: Mean Differences in ESG Performance – Asia & Oceania

	Oaxaca 1				Oaxaca 2			
Variables	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
	Explained		Unexplained		Explained		Unexplained	
_ISr_1	3.486***	(1.210)	7.755**	(3.512)	0.798	(1.414)	-2.949	(4.048)
_ICOM_1	0.116	(0.683)	1.442	(0.889)	0.000	(0.000)	1.292**	(0.540)
_ICOM_2	-0.063	(0.148)	7.850***	(1.785)	-0.023	(0.113)	4.573***	(1.585)
_ICOM_3	0.000	(0.000)	3.553***	(0.861)	0.163	(0.471)	-0.680	(1.335)
Bsz	16.793***	(4.527)	-38.574***	(9.396)	6.196	(6.904)	-15.620	(14.071)
BGd	-3.706***	(0.937)	-6.832***	(1.271)	-3.169***	(0.934)	-5.589***	(1.292)
BI	-3.382	(2.097)	7.648**	(3.317)	-3.845*	(2.266)	7.157**	(3.392)
_ICEOBm_1	-0.057	(0.135)	1.080	(4.640)	0.019	(0.089)	-2.278	(4.867)
_IEPS_1	-0.570	(0.821)	0.013	(2.109)	-0.735	(0.804)	1.486	(1.953)
_IMandRpt_1	-5.960*	(3.143)	-7.962***	(2.539)	-5.542	(7.810)	-7.105	(5.953)
_IGRIG_1	2.452***	(0.830)	7.930***	(2.538)	1.902**	(0.823)	16.486***	(2.844)
_IAuQ_1	0.641	(0.424)	0.174	(1.099)	0.474	(0.437)	-0.820	(1.307)
SZ					2.108	(3.285)	57.553**	(27.611)
Age					-0.346	(0.822)	9.983	(15.829)
Age2					0.073	(0.836)	-6.825	(10.949)
LEV					-0.010	(0.093)	-2.224***	(0.740)
ROe					0.161	(0.246)	-1.182**	(0.535)
_IInd_2					-0.278	(0.322)	0.627*	(0.359)
_IInd_3					2.174	(7.432)	5.394	(9.650)
overall								
group_1	53.347***	(1.430)	53.347***	(1.430)	53.347***	(1.431)	53.347***	(1.431)
group_2	29.787***	(1.814)	29.787***	(1.814)	29.787***	(1.825)	29.787***	(1.825)
difference	23.560***	(2.310)	23.560***	(2.310)	23.560***	(2.319)	23.560***	(2.319)
explained	9.750*	(5.578)	9.750*	(5.578)	0.120	(6.842)	0.120	(6.842)
unexplained	13.811**	(5.472)	13.811**	(5.472)	23.440***	(6.750)	23.440***	(6.750)
Constant			29.734***	(8.759)			-35.840	(25.633)
Observations	334		334		334		334	
Firm Control	No		No		YES		YES	
Ind_FE	NO		NO		YES		YES	

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Table A33: Mean Differences in ESG Performance – Europe & Oceania

	Oaxaca 1				Oaxaca 2			
Variables	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
	Explained		Unexplained		Explained		Unexplained	
_ISr_1	3.964***	(1.352)	11.753***	(4.043)	0.908	(1.607)	14.617***	(4.114)
_ICOM_1	0.129	(0.762)	-0.363	(2.065)	0.000	(0.000)	1.549	(1.695)
_ICOM_2	-0.327	(0.636)	2.815	(6.917)	-0.119	(0.566)	10.112*	(5.968)
_ICOM_3	0.000	(0.000)	0.297	(2.297)	-0.097	(0.449)	1.440	(2.224)
Bsz	12.577***	(3.440)	-20.250**	(8.272)	4.641	(5.176)	-8.678	(12.392)
BGd	0.663	(0.712)	-3.662*	(2.092)	0.567	(0.615)	-7.229***	(2.257)
BI	-1.898	(1.195)	6.194	(4.045)	-2.157*	(1.293)	2.114	(4.218)
_ICEOBm_1	0.329	(0.464)	3.462	(3.717)	-0.107	(0.471)	-1.307	(3.810)
_IEPS_1	-0.587	(0.845)	0.993	(2.487)	-0.757	(0.828)	4.147*	(2.454)
_IMandRpt_1	-2.027*	(1.134)	-10.678**	(4.703)	-1.885	(2.679)	-6.385	(11.133)
_IGRIG_1	2.571***	(0.852)	11.889***	(2.403)	1.994**	(0.852)	9.563***	(2.414)
_IAuQ_1	1.327*	(0.688)	1.118	(1.540)	0.983	(0.809)	0.777	(1.780)
SZ					2.041	(3.182)	89.703***	(25.880)
Age					-1.760	(3.215)	-0.270	(12.248)
Age2					0.235	(2.686)	-2.076	(8.512)
LEV					-0.010	(0.090)	-0.344	(0.367)
ROe					0.142	(0.220)	-0.030	(0.054)
_IInd_2					1.792	(1.588)	-3.300	(2.245)
_IInd_3					0.972	(3.327)	-2.085	(5.536)
overall								
group_1	56.268***	(1.456)	56.268***	(1.456)	56.268***	(1.457)	56.268***	(1.457)
group_2	29.787***	(1.814)	29.787***	(1.814)	29.787***	(1.825)	29.787***	(1.825)
difference	26.481***	(2.326)	26.481***	(2.326)	26.481***	(2.335)	26.481***	(2.335)
explained	16.724***	(3.914)	16.724***	(3.914)	7.386	(5.823)	7.386	(5.823)
unexplained	9.757***	(3.626)	9.757***	(3.626)	19.095***	(5.644)	19.095***	(5.644)
Constant			6.189	(14.000)			-83.224***	(24.828)
Observations	373		373		374		374	
Firm Control	No		No		YES		YES	
Ind_FE	NO		NO		YES		YES	

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

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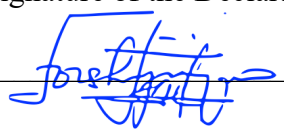

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