DOES ESG PERFORMANCE REDUCE THE COST OF CAPITAL? A COMPARATIVE STUDY OF G7 AND BRICS+ COUNTRIES.

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DECLARATION

We hereby declare that:

(1) This undergraduate research project is the end result of my own work and that dueacknowledgement has been given in the references to ALL sources of informationbe they printed, electronic, or personal.

(2) No portion of this research project has been submitted in support of any applicationfor any other degree or qualification of this or any other university, or other institutes of learning.

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Dedication

I genuinely dedicate my research to my parents, whose unfailing love, support, and encouragement have been my biggest source of strength during this academic path. Their unwavering support, tolerance, and faith in me inspired me to finish this research and gave me hope and tenacity throughout difficult times. This study would not have been feasible without their support and sacrifices. My heartfelt appreciation is extended to my family and friends for their moral, emotional, and financial support throughout this process. I dedicate this thesis to myself—for staying committed during moments of uncertainty, for continuing when motivation was low, and for believing in my ability to finish what I started. This work represents not only an academic achievement, but also personal growth and resilience.

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ASEAN	Association of Southeast Asian Nations
BRICS+	Expanded version of the BRICS bloc (Brazil, Russia, India, China, South Africa)
CAPM	Capital Asset Pricing Model
CSR	Corporate Social Responsibility
CSRD	Corporate Sustainability Reporting Directive
CoD	Cost of Debt
CoE	Cost of Equity
ESG	Environment, Social, and Governance
EU	European Union
GDP	Gross Domestic Product
G7	Group of Seven
LSEG	London Stock Exchange Group
NAFTA	North American Free Trade Agreement
PCA	Principal Component Analysis
SDG	Sustainable Development Goals
SFRD	Sustainable Finance Disclosure Regulation
SRI	Socially Responsible Investment
TCFD	Task Force on Climate-related Financial Disclosures
UN-PRI	United Nations Principles for Responsible Investment
WGI	Worldwide Governance Indicators
WACC	Weighted Average Cost of Capital

Preface

The growing emphasis on environmental, social, and governance (ESG) considerations has completely changed as a result of the increased focus on environmental, social, and governance ESG factors. Throughout my academic career, I developed a growing interest in the ways that sustainability-related practices affect the firms' access to finance, especially in a global setting where institutional frameworks and financial markets vary greatly between countries. This curiosity served as the driving force behind the current study, which compares the cost of capital and ESG performance.

This thesis focuses on businesses that operate in both developed and emerging economies, as exemplified by the G7 and BRICS+ countries. While a lot of research has been done on ESG performance within individual markets, not as much has been done on how institutional variations affect the relationship between ESG and finance in various economic settings. Particularly in emerging and transitioning markets, the role of institutional quality in mitigating the impact of ESG performance on financing costs is still poorly understood.

This study aims to provide empirical insights into how ESG performance influences various components of the cost of capital by using panel data analysis and globally recognized ESG and governance indicators. The findings are intended to contribute to the growing literature on sustainable finance and to offer practical implications for firms, investors, and policymakers navigating ESG-related decisions in diverse institutional environments.

It is hoped that this research will serve as a useful reference for future studies examining sustainability, corporate finance, and institutional quality, while also encouraging further discussion on the role of ESG in global capital markets.

ABSTRACT

Corporate financing and investment plans now heavily incorporate environmental, social, and governance (ESG) factors. Prior evidence suggests that companies that perform well on ESG may have lower financing costs, yet studies remain inconclusive across different economic contexts. The research examines how ESG performance will affect the capital costs of the firm, comparing developed and developing economies represented by the G7 and BRICS+ countries.

A panel dataset including 200 non-financial companies is examined (top 20 by market capitalization in each country) over the 2017–2023 period. ESG scores are collected through the LSEG platform, while institutional quality indicators are drawn from the World Bank's WGI. This paper estimates the effects of aggregate ESG performance using panel data regression models with company and year fixed effects. and individual pillars on firms' cost of capital measures. In order to assess the moderating influence of institutional quality, interaction terms are also added.

The findings are anticipated to offer comparative insights into the relationship between ESG and finance in various institutional contexts, with implications for investors, corporate managers, and policymakers looking to include sustainability in capital structure decisions.

CHAPTER 1: INTRODUCTION

1.1 Background of Study

In the midst of economic globalization, the UN-PRI introduced the concept of ESG in 2006. Then this concept has gained massive momentum globally, especially since the beginning of the COVID-19 pandemic (Carnevale & Drago, 2024). Since then, the concept of sustainable development has obtained extensive recognition from the global investing community. Statistics show that global ESG assets are predicted to rise from $37.8 trillion in 2021 to over $53 trillion by 2025 (Bloomberg, 2021). ESG disclosure has been more common among listed firms over the past couple of decades (Almaqtari et al., 2023). From the investors' perspective, ESG ratings provide quantifiable indicators of a company's development sustainability by reflecting its social performance and shareholder returns.

In recent years, sustainability has become an interesting topic of increasing importance worldwide, prompting governments, businesses, and civil society to adopt new practices (Apergis et al., 2022). This growing interest has firmly established ESG metrics as central to capital allocation in numerous markets. ESG factors are increasingly becoming ingrained in capital markets and the financial industry's reporting standards and business practices (Apergis et al., 2022). This trend is exemplified by the substantial influx of capital into sustainable assets. With an estimated $30 trillion in 2019, over $35 trillion in 2020, and a projected $50 trillion by 2025 (Cioli, V. et al., 2023), ESG assets under management are expected to make up more than a third of all projected worldwide assets under management (Apergis et al., 2022). In 2020 alone, sustainable investments made up $35.3 trillion, or 36% of all assets managed by professionals (Cheng et al., 2025). The market for ESG debt is likewise growing quickly; estimates indicate that it may reach $11 trillion by 2025 from $3 trillion (Apergis et al., 2022). Investors and exchanges driving the incorporation of ESG measures are responsible for this rise., which

enhances transparency and encourages sustainable investment practices (Apergis et al., 2022).

Thus, the global rise of ESG investing is fundamentally rooted in the financial premise that the company's entire risk profile is lowered by strong ESG performance, which will lead to lower capital costs (Postiglione et al., 2024). ESG measures are being used by lenders and investors more frequently to find better-managed companies, more resilient, and ultimately less hazardous investments, this idea has mobilized trillions of dollars in assets (Berg et al., 2022). In Kevser et al.'s paper, the conceptual framework linking strong ESG practices to lower risk is multifaceted, touching upon operational, regulatory, reputational, and financial resilience (Kevser et al., 2024). The default and systematic risks are reduced as firms with low ESG scores are more exposed to liabilities related to environmental, social, and corporate factors, which ultimately increases their probability of default (Apergis et al., 2022). While strong ESG management by the firms allows them to control the range of risks more effectively, including environmental, legal, reputational, operational, and regulatory threats, which positively relates to their solvency (Apergis et al., 2022). It has been demonstrated that firms that integrate ESG factors have less volatility in their stock performance, proving that this risk reduction is more than just theory (Apergis et al., 2022).

More than that, a strong ESG performance of the firm is also associated with better management of non-financial risks, which then leads to more stable cash flows and improvement in its corporate financial stability (Bertelli et al., 2025). According to research, during times of crisis, businesses with significant social capital were able to raise more money at lower spreads and for longer maturities (Owolabi et al., 2024). Similarly, during the COVID-19 pandemic, ESG-rated firms with the highest ratings were able to secure more debt financing, suggesting that Businesses with the highest ESG ratings were able to obtain more debt funding, indicating that investors view good ESG credentials as a sign of resilience. Therefore, the firm's cost of capital, which includes both the CoD and the CoE, is directly and favourably impacted by the decrease in its risk profile through high ESG performance (Postiglione et al., 2024).

The firms' decision to adopt or neglect ESG practices has significant implications for them; there could be an impact on metrics like capital accessability and financial success. Besides, the finding shows that strong ESG performance makes it easier for businesses to obtain finance, which increases worker productivity and efficiency (Birindelli et al., 2025). Firms with a solid reputation and an environmental consciousness are more likely to disclose more information about their environmental practices (Almaqtari et al., 2023). Hence, this can positively increase investor attention and affect ESG performance by alleviating financial constraints, increasing R&D spending, and strengthening customer relationships (Lu et al., 2025). In contrast, those firms that have low ESG ratings usually do not feel motivated to adopt these practices. These firms are considered riskier, resulting in increased liabilities, negatively affecting a firm's default risk and the value of its fixed-income securities (Apergis et al., 2022). Poor ESG management can lead to negative financial impact, such as direct costs, reputational risks, and negative abnormal returns in the stock market (Cheng et al., 2025).

However, despite the significant global momentum and massive capital inflows into ESG-aligned assets, the empirical evidence on the financial impact of ESG performance is often conflicting and highly context-dependent (Apergis et al., 2022). Although the fundamental idea is that effective ESG practices reduce risk and the cost of capital, academic research reveals that the reality is more complicated and nuanced (Kevser et al., 2024). For instance, a significant body of research documents the opposite, finding that firms with better ESG profiles underperform in terms of stock returns (Cheng et al., 2025). This is consistent with ideas that predict stocks with high ESG scores may have lower expected returns for ESG-oriented investors. Besides, the relationship between ESG performance and a firm's cost of capital is not consistently positive or negative across all studies (Cheng et al., 2025). The particular ESG pillar, the methodology employed, the market context, and the type of financing being examined can all have a substantial impact on the research findings (Apergis et al., 2022). Particularly conflicting research has been done on the relationship between the CoD and the social and governance pillars. One study showed no evidence of a relationship between bond spreads and the governance component of ESG, while another found no correlation

between CSR and credit spreads for European corporate bonds (Apergis et al., 2022).

In addition, the impact of ESG on financing appears to be influenced by the role of context dependency, explaining why results are not uniform across studies (Birindelli et al., 2025). Especially from the institutional and geographic context, the effect of ESG on financing is strongly influenced by the country's institutional environment (Carnevale & Drago, 2024). In countries that show a high level of sensitivity to ESG issues, firms with superior ESG performance are more likely to secure lower loan interest spreads (Carnevale & Drago, 2024). There is one study that found that while environmental aspects reduce credit risk for U.S. firms, both environmental and social aspects do so for European firms (Apergis et al., 2022). Thus, the differences in institutional and economic contexts can explain why ESG impacts vary between developed markets like Europe and emerging markets like China (Carnevale & Drago, 2024).

Based on the geographical context, most of the countries in the world can be classified as developed or developing countries. The term "developed country" is best described as a sovereign state with a mature economy and a technologically advanced infrastructure (World Population Review, 2022). The G7 economies dominate the global economy, contributing over 50% of the world's GDP (Owolabi et al., 2024). Since the 2008 global financial crisis and the subsequent Covid-19 pandemic, the G7 countries, among the world's most developed nations, have made significant progress toward their sustainable development goals by focusing on their environmental, social, and managerial aspects as well as their ESG practices (Yang et al., 2022). For instance, Italy banned fossil fuel drilling in February 2021, while France and the UK implemented measures to reduce international support for fossil fuels, and the UK announced that it will outlaw gasoline and diesel vehicles by 2030 (Kevser et al., 2024). In this regard, the G7 nations make strategic choices for their investors while enforcing strict regulations on carbon emissions and environmental effects (Kevser et al., 2024). However, there is a presence of issues in those G7 countries with ESG, especially the environmental part. Several studies have studied the variables affecting carbon emissions in different nations and found that carbon dioxide emissions from G7 nations were significant (Işık et al., 2024).

In contrast, developing countries are those whose economic and industrial growth, income, and level of living are still below average (List of 152 Developing Countries, n.d.). Then, focusing on BRICS. This group is considered the most substantial emerging market and a pivotal force in the global economy (Bagh, T. et al., 2025). In fact, the challenges of social inequality, resource availability, and disparities in development are what define developing countries. The BRICS countries are specifically identified as significant emerging economies with substantial growth potential, representing a varied set of rapidly developing economies (Subhani, B. H. et al., 2025). There are some notable global economic and demographic implications of the BRICS nations. Together, they make up about 41% of the world's population (Manjengwa, E. et al., 2025). Following the ratification of six more nations at the 2023 summit in South Africa, this number increased to include 47% of the world's population (Jesuka, D. et al., 2025). Besides, their combined nominal GDP amounts to 18.6 trillion USD, which accounts for roughly 23.2 of global GDP (Manjengwa, E. et al., 2025). The BRICS nations face particular difficulties in striking a balance between rapid economic growth and sustainability concerns, and their economic development processes are not usually sustained over the long run (Bilivogui, P., & Iqbal, M. A., 2025).

Moving on to the next issue, analyses of a company's financial health and investment appeal often focus on the cost of capital (Postiglione et al., 2024). It is a combination of the debt cost and equity cost, weighted in accordance with their respective ratios in the company's capital structure. This essential metric provides a quantitative measure of a company's risk and is crucial to capital allocation, funding availability and cost, and future business performance (Cheng et al., 2025). For instance, an empirical study using hybrid machine learning models found ESG ratings and financing costs to be negatively correlated (Hu, T., 2025). Furthermore, the research results indicate a significant direct effect of ESG factors on the CoD, based on a focus on G7 countries, suggesting that better ESG initiatives may result in cheaper financing costs for businesses (Owolabi et al., 2024).

Every ESG pillar will have a distinct impact on the cost of capital for the firms. depending on its performance in different countries. In both BRICS and G7 countries, the individual ESG pillars have a context-dependent impact on financial

performance and national development. Given that environmental factors frequently affect natural resource management and energy efficiency, human capital and community well-being are impacted by social variables. In contrast, institutional stability and regulatory efficacy are affected by governance factors (Işık et al., 2024). There is a compelling need for further investigation to determine which pillars are most important or have a greater impact on fostering sustainable performance. Managers can make more informed investment decisions by identifying the key ESG pillars and their subcomponents, and policymakers can develop more effective plans for enhancing a company's ESG performance (Mashayekhi et al., 2024).

In recent years, the relationship between ESG factors and the company's financial outcomes, particularly the cost of capital, has garnered significant attention worldwide (Cheng et al., 2025). In this regard, the need for corporate sustainability data in process of making decision has grown as a result of policies and regulations like the European Climate Law (Regulation (EU) 2021/1119), the SFDR (Regulation (EU) 2019/2088), and the Corporate Sustainability Reporting Directive (2022/2464/EU), as well as investor pressure (Birindelli et al., 2025). There is some academic research on corporate financial structure that extensively investigates, in-depth, how ESG issues affect corporate risk and, in turn, the capital costs (Albuquerque et al., 2019; Carnevale & Drago, 2024). By strongly engaging in ESG, companies are generally considered less risky by investors, while this will potentially lead to lower financing costs (Birindelli et al., 2025; Postiglione et al., 2024). Numerous studies have also demonstrated that a firm with a superior ESG profile results in reduced equity capital, loan expenses, financing constraints, and risk aversion (Hu, T., 2025). It is due to robust ESG practices that are linked to increased investor confidence through improved risk reduction, operational effectiveness, and reputational resilience (Zhao et al., 2025). The company's cost of capital is treated as a fundamental measure of its risk and valuation, establishing its relationship with ESG as a critical research topic.

Lastly, Institutional quality, as measured primarily by the WGI, is the overall effect of human-made limitations in a nation's or region's social, political, and economic interactions (Duan & Wan, 2025). It serves as a critical moderator in the relationship

between a firm's ESG performance and its cost of capital, with its influence varying significantly between developed and developing countries (Birindelli et al., 2025). Robust institutional quality in developed economies, especially in the G7 and European countries, fosters the systematic pricing of ESG variables into the cost of capital (Owolabi et al., 2024). While in developing countries, the moderating role of institutional quality is more complicated and often weaker, leading to an inconsistent and sometimes punitive relationship between ESG performance and the cost of capital (Gupta et al., 2025).

1.2 Problem Statement

Because ESG elements are now crucial to global capital allocation and are an essential tool for evaluating corporate risk, firm value, and sustainability in investment decision-making, the study of ESG and the cost of capital is extremely important. As both of them are the main core to be analyzed in this research, it is crucial to define them. ESG scores are becoming more and more important in capital allocation, affecting a company's cost and access to funding (Cheng et al., 2025). If a positive relationship exists, whereby better ESG performance leads to reduced financing costs and higher firm valuation, this provides a concrete reason for managers and policymakers to develop sustainable policies (Postiglione et al., 2024). But when discussing the exact nature of this relationship, it remains underexplored and complex, especially when comparing developed and developing economies (Apergis et al., 2022).

First of all, there are disparities in ESG disclosure and regulatory frameworks between developed and developing markets. The disclosure standards and regulatory pressures vary significantly between the markets, affecting ESG reporting's uniformity and quality. The EU are leading the way in regulating sustainable finance (Birindelli et al., 2025). The European Union (EU) has implemented comprehensive legislation, such as the SFDR and the CSRD, which mandate detailed non-financial information disclosure (Carnevale & Drago, 2024).

By increasing transparency and standardizing reporting, these regulations aim to make ESG data more reliable for investors (Almaqtari et al., 2023). In comparison to their American counterparts, European investors also have a tendency to be more demanding when it comes to green investing requirements (Grishunin et al., 2023). As a result, ESG disclosures from European businesses are generally better and more extensive (Almaqtari et al., 2023).

In developing markets, some Asian countries like China and Malaysia have introduced mandatory non-financial disclosure legislation. ESG reporting is often less standardized and comprehensive than in Europe (Lu et al., 2025). ESG disclosure, for example, is encouraged but not yet fully mandatory for all listed firms in China, leading to variability in reporting quality (Zhao et al., 2025). Furthermore, ESG rating agencies, predominantly based in developed nations, often use sustainability frameworks designed for Western markets, which may not fully capture the nuances and priorities of developing countries (Gupta et al., 2025). This can lead to an "institutional bias," where the sustainability efforts of firms in developing nations are not adequately recognized (Gupta et al., 2025).

Besides, firms in developing countries tend to have lower ESG scores than their counterparts in developed countries (Gupta et al., 2025). Several interconnected theories can explain this disparity. Firstly, the Theory of Human Needs and the EKC Hypothesis. Developing countries often prioritize fundamental needs such as poverty alleviation, infrastructure development, and employment generation over environmental goals (Gupta et al., 2025). While the Environmental Kuznet Curve (EKC) hypothesis suggests that as economies industrialize to improve living standards, pollution and resource depletion initially increase (Gupta et al., 2025). Only after reaching a certain level of economic stability will societies begin to prioritize environmental sustainability. In this case, developed economies like the G7 countries will focus more on environmental sustainability, while emerging economies such as the BRICS countries will only prioritize it when a certain level of economic stability is achieved. The institutional theory then goes on to explain how the differences in political systems, legal origins, national cultures, and labour systems shape corporate social performance (Gupta et al., 2025). When compared to companies in shareholder-focused economies, companies in stakeholder-oriented

economies, such as France and Germany, frequently demonstrate superior ESG performance. Research shows that country-level characteristics, such as economic development and institutional quality, explain more of the variation in ESG scores than firm-level characteristics do (Gupta et al., 2025).

Thirdly, the increasing integration of ESG criteria into global financial markets has created a complex and often contradictory landscape for firms in developed and emerging economies (Kevser et al., 2024). Although a growing amount of research indicates that financial gains might result from good ESG performance, the precise results, as determined by several dependent variables they reveal significant divergences in how these benefits manifest across different economic contexts (Carnevale & Drago, 2024). This variation presents a critical problem: the dependent variable selection in empirical research can fundamentally alter the perceived value and financial implications of ESG, potentially creating misleading signals for policymakers, investors, and corporate managers, and exacerbating the economic divide between developed and developing countries (Carnevale & Drago, 2024).

However, existing research largely relies on limited or inconsistent indicators, including measurement scope, specific pillar focus, and firm characteristics, which often leads to overlooking other crucial dimensions and complicating the comparability of findings (Apergis et al., 2022). This research treats ESG not merely as a social concern but as a determinant of financial performance. By examining the impact of ESG on the cost of capital, we can determine whether sustainable business practices result in real financial gains. Moreover, it is crucial to compare the G7 and BRICS economies as disparity occurs. Most of the empirical findings are based on developed markets, such as the countries in the G7, due to better data availability and standardized ESG reporting frameworks. In contrast, research in developing economies remains relatively scarce, where findings might be inconsistent. According to Owolabi et al.'s research in 2024, it mentioned that the BRICS and other developing economies should be included in future studies (Owolabi et al., 2024). A comparative causality analysis between developed (like G7) and developing countries is recommended to provide stronger evidence (Kevser et al., 2024). This study investigates whether the financial impacts of ESG

are contingent on market development, investor awareness, and disclosure quality, or if the significance of ESG is constant across institutional contexts.

The CoD is the primary variable used to measure the direct financial benefits of ESG (Apergis et al., 2022). In developed economies, particularly the G7 and Europe, the evidence often points to a clear financial reward for strong ESG performance (Carnevale & Drago, 2024). International agreements like the Paris Agreement have amplified lenders' awareness of carbon risk, leading to higher borrowing costs for carbon-intensive firms, especially in the G7. However, even within developed markets, the relationship can be inconsistent, moderated by factors like the development of financial institutions versus markets (Birindelli et al., 2025). In developing economies like China, while some studies show that better ESG performance can reduce financing costs, the effect is often weaker or moderated by factors like state ownership and regulatory intensity (Xiao & Xu, 2025). The institutional context is crucial; the benefits of ESG on the CoD are more significant when a country has highly developed financial institutions that actively price ESG risks (Birindelli et al., 2025).

While the relationship between ESG on the CoE shows more contested and reveals sharp differences. In developed markets, certain theories and empirical findings suggest that robust ESG practices can mitigate systematic risk, thereby reducing the CoE and enhancing firm value (Albuquerque et al., 2019). Frequently, mechanisms such as improved customer loyalty and product differentiation are used to explain this. In emerging economies, the link is even more tenuous. Research conducted in Latin America has revealed a negative correlation between financial performance and ESG scores (Kevser et al., 2024). Similarly, research on Chinese firms shows that high ESG rating divergence undermines the positive signaling effect of ESG, hindering access to external financing (Apergis et al., 2022).

Despite the relationship between ESG factors and the cost of capital being a major focus in existing research, the impact of ESG continues to yield conflicting and inconsistent findings (Birindelli et al., 2025). This empirical analysis demonstrates that there is frequently a lack of consistency in the relationship between ESG performance and the firms' financial success, particularly their cost of capital. Since

there isn't a clear or consistent result, numerous factors that are either uncontrolled or inadequately handled may be affecting this relationship. Additionally, strong ESG performance is presumed to have financial advantages. However, this is diminished by large ESG rating disparity, which also increases the possibility of financing costs (Zhao et al., 2025). Because of this "aggregate confusion," ESG integration is unreliable and may deter businesses from making investments in ESG performance (Cheng et al., 2025).

Additionally, past research had an over-reliance on data from developed markets. The fact that the majority of current research focuses on developed markets is a major drawback. In fact, established legal frameworks and uniform ESG disclosure standards exist in both the U.S. and the EU (Carnevale & Drago, 2024). Hence, there is a comparison and a largely unexplored area done on the vast universe of firms in developing countries. Higher ESG ratings are typically linked to lower unsecured debt costs in G7 nations. The findings from established economies might not apply to developing countries because of the different institutional contexts, national priorities, and market dynamics. For instance, employment generation or community development might take precedence over environmental objectives in developing countries, a nuance often missed by global ESG scoring agencies in the U.S. and Europe. According to the Global Footprint Network, Canada and the USA have significant carbon footprints in metric tons per capita, followed by other G7 countries, which have lower emissions respectively (Global Footprint Network, 2024).

In stark contrast, evidence shows that emerging countries struggle with far lower corporate ESG ratings compared to their developed counterpart (Gupta et al., 2025). This discrepancy is significant; even after standardization, developing country firms' ESG scores were about 23% lower and 57% lower in economic significance, suggesting fundamental issues beyond just institutional differences (Gupta et al., 2025). Furthermore, global ESG-scoring firms ‘unfairly punish’ those developing countries' companies by assigning them lower scores, according to empirical data. This downward bias persists even after accounting for institutional differences and national priorities, pointing to issues with ESG rating methodologies and institutional biases. ESG ratings differ considerably among alternative rating

agencies, with low levels of correlation across providers. However, even when mandatory ESG disclosure policies are implemented in developing countries, they often aim to advance national socio-economic goals rather than align with sustainability frameworks shaped by developed economies.

Studying these ESG pillars individually, the standardized environmental scores for firms in developing countries are roughly 20% lower than those in developed countries, and their raw environmental scores are roughly 56% lower (Gupta et al., 2025). In earlier phases of development, this frequently represents a national emphasis on industry and fundamental needs over environmental considerations. Evidence from China, firms in high-pollution sectors like energy and heavy industry benefit most from ESG improvements, as evidenced by the significant reductions in debt financing (Zhao et al., 2025). Next, the raw social scores are approximately 28% lower in developing countries, and standardized social scores are about 16% lower than in developed countries. Developing countries often prioritize social equity, such as employment generation and community development, which can contribute to their social scores (Gupta et al., 2025). Lastly, the study shows that the raw governance scores are approximately 51% lower in developing countries, and about 21% lower for standardized governance scores. Thus, China, as one of the most developed countries, but categorised as a developing country due to its GDP per capita, and there is still an issue with its ESG performance. These situations might be occurring in other countries as well, no matter developed or developing countries. It is meaningful to compare these ESG scores in both G7 and BRICS+ countries, as there are different issues across the three aspects: Environmental, Social, and Governance.

Moving on, the following concern is that the focus and effectiveness of each ESG pillar vary between the G7 and BRICS countries. According to Taddeo et al.'s research in 2024, it demonstrates that instead of trying to commit to all three dimensions at once, firms should focus primarily on one of the three pillars independently (Taddeo et al., 2024). Besides, it is more effective to specialize in one dimension of ESG practices rather than attempting to pursue them all at once (Taddeo et al., 2024). Due to limited financial resources, firms might be forced to focus mainly on one pillar to yield better results than trying to balance efforts across

all three. By knowing which pillar contributes the most to them, firms can invest in the one pillar that has a significant effect, allocating their limited funds and resources.

For firms in the G7 countries, the literature indicates a primary focus on the Environmental pillar, although the other pillars also bring certain impacts (Apergis et al., 2022). The Environmental pillar is particularly effective for firms operating in G7 countries because of their reduced CoD. Lower borrowing costs are frequently linked to better environmental performance (Carnevale & Drago, 2024). Research on G7 companies frequently focuses on the effects of climate agreements like the Paris Agreement, carbon emissions, and green finance (Owolabi et al., 2024). Securing favourable financing now requires outstanding environmental performance since lenders are now much more scrutinizing of carbon risk as a result of the Paris Agreement (Owolabi et al., 2024). Hence, investors and lenders in G7 countries, influenced by regulations and public pressure, increasingly price environmental and climate risks into their lending decisions (Apergis et al., 2022).

Meanwhile, while all the pillars are relevant, firms and investors might prioritize differently due to varying stages of economic development and regulatory environments (Baek et al., 2023). Emerging economies such as those in BRICS generally prioritize immediate issues such as economic growth, poverty alleviation, and infrastructure development over stringent environmental goals (Gupta et al., 2025). This supports the "Theory of Human Needs", which suggests that in these regions, social equity may take precedence over environmental goals very immediately (Gupta et al., 2025). The Social pillar appears to be a more immediate and effective focus for many firms in BRICS countries. Stakeholder relationships and a firm's legitimacy are improved in its operational environment when social issues are prioritized since they are in line with the urgent socioeconomic objectives of many developing countries (Gupta et al., 2025).

Past researchers have analysed a variety of moderating variables when investigating the impact of ESG factors, or related concepts, on financial outcomes, including the cost of capital. These moderators help explain how and why the relationship between ESG performance and financing costs can differ across various contexts and firm characteristics. The first moderator stated was the borrower's

creditworthiness and governance. Firms with good credit ratings and governance benefited from ESG strengths. However, some studies find governance less relevant than environmental and social dimensions, especially for listed and rated companies where governance information is available from multiple sources. A research gap has existed, as past studies have only included these moderators; many of them have not been widely discussed yet.

Hence, this leads to a broader and more complex problem: the relationship between ESG factors and cost of capital is likely contingent on the quality of institutions in a given country. Institutional quality indices provided, such as control of corruption, government effectiveness, political stability and absence of violence/terrorism, regulatory quality, rule of law, and voice and accountability, can significantly affect the way ESG disclosures are interpreted and acted upon by financial market participants. Investors may view ESG information as reliable and financially significant in nations with high institutional quality, which could result in real financial gains for businesses. In lower-quality institutional environments, the same ESG signals may be viewed with scepticism or may not influence investment behaviour at all. Although this viewpoint is relevant, existing literature somehow rarely examines institutional quality as a moderating variable in the ESG and cost of capital nexus.

In short, the current understanding of ESG's impact on the cost of capital remains incomplete without considering the role of institutional quality. As ESG practices and their financial implications are shaped by the broader regulatory and institutional environment, this study aims to fill that gap by explicitly examining how institutional quality affects the direction and magnitude of ESG's influence on capital costs in both developed and developing economies. By introducing institutional quality into the analysis, this research moves beyond a binary comparison of country groups and contributes to a more detailed comprehension of the circumstances under which ESG performance becomes financially significant.

1.3 Research Questions

1. Does superior ESG performance lead to a lower cost of capital in G7 and BRICS+ firms, and does the magnitude of this effect differ significantly between the two regions?
2. Which of the individual Environmental, Social, and Governance pillars has the most significant impact on the cost of capital, and are there differences in their relative importance between G7 and BRICS+ contexts?
3. To what extent does country-level institutional quality moderate the relationship between firm-level ESG performance and the cost of capital?

1.4 Research Objectives

1. To investigate whether superior ESG performance leads to a lower cost of capital in firms from G7 and BRICS+ countries, and to compare the magnitude of this effect across the two regions.
2. To examine the influence of the individual Environmental, Social, and Governance (E, S, and G) pillars on the cost of capital, and to assess whether their relative importance differs between developed and developing contexts.
3. To analyse the moderating role of country-level institutional quality in shaping the relationship between firm-level ESG performance and the cost of capital.

1.5 Significance of Study

The studies highlighted the significant implications of ESG factors for various stakeholders and the broader financial landscape, making meaningful contributions to academic research, corporate practice, and policy formulation in the field of sustainable finance.

Firstly, the research addresses a notable gap in ESG literature by providing a comparative analysis of how ESG factors affect the cost of capital across countries with varying levels of economic development. While most existing studies focus on developed markets, this research extends the discourse to include developing economies and introduces institutional quality as a moderating variable. By doing so, academicians can better understand this topic, and it provides them with a clearer picture, enabling them to conduct more valuable research in the future.

For corporate decision-makers, the findings offer evidence-based insights into how ESG strategies may influence capital access and financing costs in different market environments. Firms operating in countries with weak institutional frameworks can better understand the limitations and strategic risks of ESG initiatives. Conversely, in strong institutional settings, companies may recognize ESG performance as a means of gaining financial advantages, such as a lower CoE or debt.

From an investor standpoint, the research provides portfolio managers, asset allocators, and ESG analysts about the reliability and value-relevance of ESG disclosures in different jurisdictions. The findings are crucial for understanding the risk-return profile associated with ESG performance. Better ESG ratings are linked to lower systematic risk and higher firm valuation.

There are also important implications for regulators and policymakers, particularly in developing economies where ESG integration is still emerging. The studies underscore the need for comprehensive guidelines for environmental and sustainability reporting, advocating for improved transparency and reporting of quantifiable ESG information. Findings can assist policymakers in understanding and optimizing market regulations related to ESG, guiding better corporate ESG practices, and aligning with new sustainability disclosure guidelines.

1.6 Scope

This study focuses on the top five G7 economies by their stock market capitalisation, which are the United States, Germany, the United Kingdom, Canada, and France, to represent the developed country sample. These countries collectively account for the majority of global equity market capitalization and host some of the most liquid and internationally integrated financial markets (Global Economic Prospects January 2016 Spillovers from Major Emerging Markets, 2016). Their inclusion ensures that the sample reflects the largest, most influential capital markets, where ESG integration is relatively advanced and institutional frameworks are robust. Although they are members of the G7, Canada and Italy were excluded to maintain a narrow and controlled scope and because their stock markets aren't as large as those of the top five.

Besides, the sample has also chosen a set of emerging market economies that combine three core members of the BRICS group, which are Brazil, India, and China, with two BRICS+ partner countries, Malaysia and Thailand. The reason behind on choosing the three core members of BRICS is due to their pivotal global role. These nations constitute a group of significant emerging economies with substantial growth potential (Bagh, T. et al., 2025). They are vital to the world economy and provide a substantial contribution to commerce and sustainable growth (Bagh, T. et al., 2025). In the meantime, incorporating Malaysia and Thailand broadens the analysis to include rising markets in Southeast Asia that are actively creating sustainable finance ecosystems and ESG disclosure standards.

At the firm level, the study restricts its analysis to the top 20 firms by market capitalization in each of the 10 countries, producing a total sample of 2000 firms. The ranking of the top 20 firms will exclude financial institutions, due to their different structure from normal firms. Large-cap firms are selected because they are more likely to disclose reliable ESG data, given stricter regulatory requirements and higher scrutiny from investors and stakeholders (Ioannou & Serafeim, 2017). Moreover, large firms are typically more integrated into global capital markets, making them particularly sensitive to the expectations of international investors, who have been the primary drivers of ESG adoption worldwide (Krüger, 2015).

Since their financing costs are more immediately impacted by changes in global sustainable finance trends, they are excellent candidates for investigating the relationship between ESG performance and cost of capital.

Temporally, the study covers the period of seven years from 2017–2023. This timeframe is justified for several reasons. First, the Task Force on Climate-related Financial Disclosures (TCFD) released its final recommendations in 2017, which became a global benchmark for ESG and climate-related reporting 2017 (TASK FORCE on CLIMATE-RELATED FINANCIAL DISCLOSURES (TCFD) APPLICATION GUIDE for MALAYSIAN FINANCIAL INSTITUTIONS, n.d.). Second, in line with the beginning of this study, Bursa Malaysia in ASEAN began requiring sustainability reporting for listed businesses in 2016. Over the following years, the requirement has gradually been strengthened. Third, this time frame reflects the acceleration of ESG investing after 2020, when global ESG assets surpassed USD 35 trillion (GLOBAL SUSTAINABLE INVESTMENT REVIEW 2020,2021), and the implementation of landmark regulations such as the EU's Sustainable Finance Disclosure Regulation (SFDR) in 2021, which has had spill-over effects on disclosure practices worldwide (European Commission, 2023). Thus, the 2017–2023 timeframe is therefore a suitable horizon for examination since it represents a pivotal time in ESG adoption and regulatory enforcement.

Regarding variables, the study encompasses both composite ESG scores and the three individual pillars: environmental, social, and governance. The cost of capital serves as the dependent variable. Institutional Quality is also measured through the Worldwide Governance Indicators from the World Bank, which is employed as a moderating variable to assess its influence on the ESG–cost of capital relationship.

1.7 Limitations

Despite this research providing a structured comparison between the G7 and the BRICS+ countries, it is important to acknowledge the limitations of this introduction. The G7 countries, including the United States, Germany, the United

Kingdom, Canada, and France, are often considered highly advanced economies with strong institutional frameworks, mature capital markets, and extensive ESG regulatory structures. Conversely, the BRICS members, with their partner countries, like Brazil, India, China, Malaysia, and Thailand, reflect an analytics group where the countries in the group are emerging economies with growing but uneven institutional and financial development. However, the groupings do not fully represent the broader categories of "developed" and "developing" countries as recognized by international organizations such as the World Bank or the IMF.

The G7 group does not include all advanced countries, for example, Australia, South Korea, Switzerland, and others, which also have strong ESG practices and institutional environments. Second, the BRICS group does not capture the full heterogeneity of developing economies as well, many of which are located inside Southeast Asia or outside of it, such as South Asian, African, or Latin American nations. Consequently, rather than reflecting developing countries generally, the results might disproportionately represent the institutional and market circumstances of Southeast Asia.

Besides, the CoD is one of the dependent variables chosen. The chosen proxy is the accounting-based measure of Interest Expense / Total Debt (Apergis et al., 2022). While this is a common measure, it is important to acknowledge its limitations (Nizam et al., 2021). Specifically, this ratio reflects the historical average CoD on a firm's books rather than the current marginal cost of raising new debt in the market (Carnevale and Drago, 2024). Notwithstanding this drawback, there are practical reasons to employ this accounting-based metric, chief among them being the availability of data for a sizable cross-national sample (Xiao & Xu, 2025). Hence, obtaining consistent, market-based data across numerous countries and firms presents significant challenges.

Furthermore, in the process of constructing a composite index from the six Worldwide Governance Indicators (WGI), this study will use a simple average of the six indicators. This approach is considered methodologically acceptable for its transparency and ease of interpretation. However, it is important to acknowledge that more sophisticated methods, such as Principal Component Analysis (PCA), were considered (Owolabi et al., 2024). By identifying and capturing the most

significant shared variance among these correlated indicators, PCA can construct a composite index where the weights assigned to each indicator are statistically derived rather than assumed to be equal (Carnevale and Drago, 2024). Eventually, the PCA method was considered, but a simple average is opted for transparency and ease of interpretation.

A well-documented issue in sustainable finance is the significant divergence in ESG ratings provided by different agencies for the same company, a phenomenon described as "aggregate confusion" (Cheng et al., 2025). Unlike credit ratings, which show high levels of correlation (often around 0.99) across major agencies like Moody's and Standard & Poor's, the correlation between ESG scores from different providers is markedly low, often ranging from just 0.38 to 0.71 (Berg et al., 2022). Studies confirm this low correlation across numerous major rating agencies, including MSCI, Refinitiv, Sustainalytics, KLD, Moody's ESG, and S&P Global (Berg et al., 2022).

This divergence poses a significant challenge for investors, companies, and researchers. For investors, it creates uncertainty and makes it difficult to reliably evaluate the ESG performance of companies, funds, and portfolios (Berg et al., 2022). For companies, the mixed signals from different rating agencies can hinder their efforts to improve ESG practices, as they receive conflicting information about which actions are most valued by the market (Berg et al., 2022). For empirical research, the choice of a specific rating provider can fundamentally alter a study's results and conclusions (Berg et al., 2022).

1.8 Organization of the Thesis

This thesis is structured into five chapters: Introduction, Literature Review, Research Methodology, Results and Findings, and Discussion and Conclusion.

Chapter 1: Introduction

This chapter provides the foundation of the study by discussing the research background, problem statement, research questions, and research objectives. It also highlights the significance, scope, and limitations of the study, and concludes with a layout of the chapters to guide the reader through the thesis structure.

Chapter 2: Literature Review

This chapter reviews theoretical foundations and prior empirical studies relevant to ESG performance, cost of capital, and institutional quality. It further examines the individual ESG pillars and their effects on financing costs. Based on these discussions, the conceptual framework is constructed, and research hypotheses are developed.

Chapter 3: Research Methodology

This chapter outlines the methodological approach adopted in the study. It covers the research design, data sources, sampling strategy, and criteria for selecting countries and firms. The measurement and operationalization of variables are explained, followed by the development of statistical models and hypothesis testing procedures. The chapter also details the diagnostic tests, robustness checks, and the software tools used for the analysis.

Chapter 4: Results and Findings

This chapter presents the empirical results of the study. It begins with descriptive statistics and correlation analysis, followed by the outcomes of the regression models used to test the hypotheses. The findings are analysed and discussed in relation to the research objectives, with comparisons drawn between developed (G7) and developing (BRICS+) economies.

Chapter 5: Discussion and Conclusion

This chapter provides a synthesis of the key findings and discusses their theoretical, practical, and policy implications. It also addresses the limitations of the study and suggests directions for future research. The chapter concludes by reinforcing the study's contribution to the literature on ESG performance and the cost of capital in differing institutional contexts.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter provides a comprehensive review of the theoretical and empirical foundations relevant to the relationship between ESG factors and the cost of capital, with a particular focus on the moderating role of institutional quality. The review begins by discussing the origins and evolution of ESG practices, as well as the concept of cost of capital and its importance in financial decision-making. It then examines the key theoretical perspectives that explain why and how ESG performance may impact firms' financing costs, drawing on stakeholder theory, agency theory, signaling theory, and institutional theory. A synthesis of empirical studies is presented to highlight the existing evidence on the ESG–cost of capital nexus across different contexts, including both developed and developing economies. Through this review, research gaps are identified, particularly the lack of comparative analyses that integrate institutional quality as a moderating factor. Based on these gaps, hypotheses are developed to guide the empirical investigation. The chapter concludes with the presentation of a conceptual framework that illustrates the relationships among the variables of interest and sets the foundation for the methodology and analysis in the subsequent chapters.

2.2 The Concept of ESG Factors and Cost of Capital

The concept of ESG factors has grown in importance in financial decision-making and capital allocation, with a significant implication on a company's cost of capital

(Owolabi et al., 2024). Therefore, it is necessary to discuss the overview of the concept, history, as well as the impact of ESG factors on the cost of capital.

First of all, the definition of ESG factors is known by the three broad categories of criteria used to evaluate a company's performance, policy, and risk profile (Alessandro Del Vitto et al., 2023). The “Environmental” pillar includes the impact of a company on the natural environment, such as carbon emissions, water usage, waste production, and overall environmental impact. Whereas the “Social” pillar will include employee treatment, community engagement, product quality, and human rights, referring to a company’s impact on society. As well as the “Governance” pillar, it relates to a company’s management by having a leadership structure, corporate ethics, shareholders' rights, executive compensation, and board diversity (Alessandro Del Vitto et al., 2023).

On the other hand, the cost of capital is a fundamental concept in finance that represents the expense incurred by a company for its financial purposes of operations and investments (Xiao & Xu, 2025). It serves as a quantitative measure of corporate risk; a higher cost of capital denotes a larger degree of uncertainty about future financial and economic outcomes, and as a result, a lower firm value (Postiglione et al., 2024). Beginning in the early 20th century, this concept has evolved over the course of a century and remains a potent metric for both academic studies and professional applications (Postiglione et al., 2024). There are two main components in the cost of capital: the CoD and CoE. CoDrefers to the expense a firm incurs when raising capital through various debt instruments, such as bank loans or bond issuance (Apergis et al., 2022). Then, the return that equity investors require to hold a company's stock is known as the CoE. Traditional financial measurements have long been the main focus of cost of capital research, but in recent decades, ESG factors have become increasingly integrated (Postiglione et al., 2024). There are several studies on the relationship between ESG performance and the cost of capital, which includes the CoD and the CoE. Most of them show that better ESG performance can result in reduced financing costs (Apergis et al., 2022).

2.2.1 Development/History of ESG

Before the term "ESG" was formally coined, its principles were rooted in the concept of CSR, which is known as Corporate Social Responsibility (Carnevale and Drago, 2024). Over 90 years ago, Socially Responsible Investment (SRI) introduced the first types of responsible investing. SRI primarily used negative screening to exclude companies involved in ethically questionable sectors like tobacco or gambling (Cheng et al., 2025; Gupta et al., 2025). Later, this method developed into the more proactive positive screening strategy, which seeks to identify companies with strong sustainability practices (Alessandro Del Vitto et al., 2023).

The term ESG was officially introduced in 2006 through the United Nations Principles for Responsible Investment (UN-PRI) report, "Who Cares Wins" (Lu et al., 2025). Guidelines for improving the financial sector's integration of social, governance, and environmental concerns were included in this report (Alessandro Del Vitto et al., 2023). The 2008 global financial crisis further accelerated the adoption of ESG, as it highlighted the need for more robust risk management and long-term value creation beyond short-term profits (Kevser et al., 2024).

Sustainable finance has expanded significantly since its inception. The expected value of ESG assets under management increased from $30 trillion in 2019 to over $35 trillion in 2020 (Apergis et al., 2022). According to projections, this amount may exceed $50 trillion by 2025, accounting for over one-third of all assets under management worldwide (Apergis et al., 2022). The ESG debt market is also expanding rapidly, with projections suggesting it could grow from $3 trillion to $11 trillion by 2025 (Apergis et al., 2022).

Several key factors drive the growth of ESG. Firstly, the increase in investor demand. A growing number of institutional and retail investors are integrating ESG criteria into their decision-making processes (Gupta et al., 2025). Approximately 70% of investors stated that they were taking sustainable investment principles into account in 2020, and by 2021, more

than 4,000 institutional investors with a total of $120 trillion in assets had committed to incorporating ESG considerations into their strategies (Cheng et al., 2025).

Secondly, a slight push towards the ESG regulatory. Regulations have been put in place by governments and international organizations to encourage ESG performance and disclosure (Carnevale and Drago, 2024). Key initiatives include the Paris Agreement in 2015, the UN Sustainable Development Goals (SDGs) that were introduced in 2015, and various EU regulations such as the Corporate Sustainability Reporting Directive in 2022 and the Sustainable Finance Disclosure Regulation in 2019 (Apergis et al., 2022). Due in part to regulatory constraints and stakeholder demand, firms are measuring and disclosing sustainability risks and opportunities more often (Almaqtari et al., 2023).

Moreover, a global commitment to sustainability was expressed by key international accords that had a substantial impact on the development of ESG. The 1997 Kyoto Protocol was one of the early international treaties aimed at reducing emissions of greenhouse gases, establishing the framework for upcoming climate action (Owolabi et al., 2024). Followed by the Paris Agreement in 2015, this agreement marked a pivotal moment by involving both developed and developing nations in the effort to limit global temperature rise (Owolabi et al., 2024). Financial markets have placed a greater emphasis on carbon risk in the years following the Paris Agreement, and lenders and investors are increasingly including this risk in their calculations (Owolabi et al., 2024). The research shows that the impact of carbon risk on the CoD for companies became significantly higher after the agreement was signed.

As ESG investing grew, so did the demand for standardized metrics to evaluate corporate performance. As a result, in the 1980s and 1990s, ESG rating agencies like Kinder, Lydenberg, and Domini (KLD) in 1990 and Eiris in 1983 came into being (Taddeo et al., 2024). In current days, there are around 140 rating agencies, including major players like MSCI, Refinitiv, and Sustainalytics (Gupta et al., 2025; Taddeo et al., 2024).

2.2.2 Relationship between ESG Factors with Cost of Capital

Excellent ESG performance is increasingly linked to a lower cost of capital for firms, a relationship supported by various theoretical frameworks and growing empirical evidence (Apergis et al., 2022). Lenders and investors see strong ESG practices as signs of improved long-term value, better management, and less risk, all of which can result in better financing terms (Birindelli et al., 2025).

There are a few impacts of ESG performance on the cost of capital, where numerous studies show that companies with strong ESG credentials benefit from a lower CoD and equity (Apergis et al., 2022). Interest rates on bank loans or bond spreads are commonly used to calculate the CoD (Apergis et al., 2022). A comprehensive review of 38 studies confirms that lenders generally penalize poor ESG performance with higher loan spreads (Carnevale and Drago, 2024). Strong ESG practices help firms get better credit ratings and better loan terms because they are seen as less risky (Birindelli et al., 2025). For example, a 2010–2019 research of S&P 500 corporations revealed that lower costs for unsecured loans in the primary bond market were linked to higher ESG ratings (Apergis et al., 2022). Research on European corporate green bonds also found a "greenium," where green bonds are priced at a discount (lower yield) compared to conventional bonds of the same risk, a benefit that increases if the bond has an ESG rating (Grishunin et al., 2023).

Similarly, high ESG performance can also lower the CoE (Cheng et al., 2025). This is because effective ESG procedures lower a company's systematic risk (beta) and draw in investors who are concerned about sustainability, both of which can raise demand for the company's shares (Albuquerque et al., 2019). A study by Albuquerque et al. found that higher

CSR is associated with lower systematic risk, and this effect is stronger for firms with high product differentiation (Albuquerque et al., 2019). A recent literature review confirms that a firm's risk profile is a fundamental driver in the ESG-firm value relationship as well (Postiglione et al., 2024).

Therefore, this indicates that effective ESG performance helps companies manage a variety of risks, which eventually reduces their default risk and increases their appeal to lenders (Apergis et al., 2022). Starting with the regulatory and legal risk reduction. Firms with robust ESG policies are better equipped to handle and foresee changes in regulations, including more stringent labour or environmental rules (Apergis et al., 2022). For instance, regulations like carbon taxes or emissions trading schemes pose serious transition risks to businesses in highly polluting industries. A company's financial stability may be threatened by expensive fines, penalties, and environmental litigation, all of which can be avoided with proactive environmental management (Apergis et al., 2022).

Next, it also affects the operational and supply chain resilience. In fact, effective ESG management often involves improving resource efficiency, such as water and energy use, which not only cuts costs but also reduces exposure to resource scarcity and price volatility (Apergis et al., 2022). Robust supply chains and a more stable and productive workforce can result from strong social policies, including fair labour standards and community involvement (Bertelli et al., 2025).

Then, it enhances the reputation and stakeholder relationships. Among important stakeholders, such as consumers, workers, and communities, strong ESG performance fosters loyalty and trust (Birindelli et al., 2025). In times of crisis, this "social capital" might serve as a buffer; for example, during the 2008–2009 financial crisis, companies with higher social capital were able to obtain more loans at lower spreads (Owolabi et al., 2024). On the other hand, inadequate ESG management can lead to reputational damage, customer boycotts, and difficulties in attracting and retaining talent, all of which increase default risk (Apergis et al., 2022).

2.2.3 The G7 and BRICS+ Countries

The Group of Seven (G7) is a distinct economic bloc, often representing developed economies (Owolabi et al., 2024). The Brazil, Russia, India, China, and South Africa (BRICS) is an analytical group that represents significant emerging economies (Bagh, T. et al., 2025). Then, Malaysia and Thailand are considered the core economies within the ASEAN-5 region, with other countries, consistent with IMF and ADB practice in defining the major emerging markets of Southeast Asia (Asian Development Outlook 2022: Mobilizing Taxes for Development, 2022). The G7 consists of major advanced economies, while the countries in BRICS, alongside Malaysia and Thailand, are the world's significant developing and emerging markets. Despite their strong integration into the global economy, the two groups differ in their aspirations for sustainability, economic structure, and developmental stage (B. Suresh Lal, 2023).

The G7 is a coalition of seven of the world's largest and most advanced economies: Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States (Owolabi et al., 2024). A "non-enumerated" member since 1981 is another historical fact about the European Union (B. Suresh Lal, 2023). G7 members represent a significant portion of the global economy. Based on nominal values, they made up more than 60% of the world's net worth and over 46% of the global gross domestic product (GDP) in 2018 (B. Suresh Lal, 2023). Even though they no longer account for roughly 70% of the world's GDP, they are still a significant economic force. Out of the G7 countries, the US has the highest GDP (B. Suresh Lal, 2023).

Besides, the G7 countries are major energy consumers and emitters. They account for approximately 30% of worldwide energy utilization and 25% of global energy-related CO2 emissions (Owolabi et al., 2024). They are now at the forefront of international climate change debates and policy actions as a result of their substantial impact (Owolabi et al., 2024). As advanced economies, G7 nations have been active in promoting sustainability,

particularly through initiatives like the Paris Agreement, which they all signed in 2015. According to research, lenders in G7 nations started factoring carbon risk more heavily into their lending choices following the Paris Agreement, indicating a greater understanding and dedication to climate change mitigation among their financial sectors (Owolabi et al., 2024). Studies confirm that green financing, clean energy, and green economy development are positive indicators for sustainable practices that are measured by ESG pillars in G7 industries (Yang et al., 2022).

Meanwhile, the BRICS countries, which consist of five significant developing nations that contribute substantially to global economic trends (Subhani, B.H. et al., 2025). They collectively represent about 41% of the global population and contributed 45% of global carbon dioxide emissions in 2020 (Jesuka, D. et al., 2025). Actually, each of the BRICS countries has ratified both the 2015 Paris Agreement and the 1992 UN Convention on Climate Change.

The reason behind this is due to the presence of the BRICS group, Malaysia, and Thailand in the developing country samples. These countries are frequently included by researchers in samples that represent developing or emerging economies, particularly within studies focused on emerging markets, sustainability, and corporate finance dynamics. For instance, the BRICS countries are a popular subject for contemporary research, frequently comprising huge samples to look into topics like corporate capital structure (CCS), green innovation, and ESG performance (Bagh, T. et al., 2025). In the research of Owolabi et al in 2024, researchers recommended that future studies should specifically encourage broadening their scope to include BRICS nations (Owolabi et al., 2024). For Malaysia and Thailand, they are frequently included as part of samples covering Asian economies or specifically the ASEAN-5 region. Additionally, Malaysia is noted for publishing a significant number of research articles of institutional quality (Duan, L., & Wan, X., 2025).

These nations are recognized as critical players in international markets and represent a significant portion of the global economy (Bilivogui, P., & Iqbal,

M. A., 2025). They are major emerging economies with substantial growth potential (Bagh, T. et al., 2025). As the members of the ASEAN-5 region, Malaysia and Thailand have significantly benefited from their integration into the world economy, especially through trade. As a bloc, these economies are important players in the global market. Statistics also show that the ASEAN-5's integration with global trade is substantial, with the ratio of total trade to regional GDP reaching 90% in 2021, which is higher than comparable economic blocs like the EU and NAFTA (Baek et al., 2023). Due in large part to trade, the region has profited greatly from its integration into the global economy (Baek et al., 2023).

2.3 Theoretical Framework

The following theories will explain the relationship between ESG performance and the cost of capital of the firms in both developed and developing countries, which are the G7 and BRICS+ groups. There are three types of relationships to be discussed: positive, negative, and no relationship between the variables.

2.3.1 Signaling Theory and Stakeholder Theory

Signaling Theory was created by Michael Spence in 1973, and Stephen A. Ross (1977) adapted it to financial structure in further work. It focuses on situations when there is an information asymmetry between two actors; the sender must choose which information (the signal) to communicate to the receiver (Osburg et al., 2022). To the stakeholders, companies with strong ESG performance can effectively communicate a lower risk profile, a long-term focus, and a dedication to shareholder value (Birindelli et al., 2025). This improved creditworthiness facilitates access to external funds and can

result in lower debt financing options due to reduced information asymmetries and monitoring costs. Due to fewer information asymmetries and monitoring expenses, this increased creditworthiness makes it easier to obtain outside funding and may lead to fewer possibilities for debt financing (Birindelli et al., 2025). ESG engagement is also associated with lower risk perceptions among investors and rating agencies, minimizing the likelihood of environmental scandals. Strong ESG procedures are associated with better risk reduction, operational effectiveness, and reputational resilience, all of which raise investor confidence and lower capital expenditures (Zhao et al., 2025).

To relate to the topic, firms that are operating under conditions of asymmetric information, where insiders, such as the management, have more information than outsiders, who are the investors. Firms can communicate to external investors their underlying quality, lower risk profile, and dedication to long-term value through observable actions such as strong ESG performance (Zhao et al., 2025). Besides, managers use ESG transparency and disclosure to demonstrate their dedication to good policies, which reduces information asymmetries. Hence, it is expected to show a positive relationship as ESG factors reduce capital costs.

Stakeholder theory (ST) is an organizational management and business ethics framework (Schaltegger et al., 2019). It was invented by R. Edward Freeman in 1984. This theory posits that companies should be managed by considering the interests of all stakeholders, not just shareholders (Kevser et al., 2024). Integrating CSR, environmental, and governance practices is crucial for businesses to gain resources and support from stakeholders. Businesses can reduce risks such as reputational, financial, and legal risks related to environmental externalities or social misconduct by attending to the concerns of different stakeholders (Owolabi et al., 2024). With such strong relationships with the external environment, it can reduce long-term risks and capital costs (Kevser et al., 2024). Companies that incorporate sustainability considerations into their plans become more long-term focused and can draw in long-term investors. This boosts stakeholder

reputation and trust, which has a beneficial impact on financial performance (Kevser et al., 2024).

Relating to this research, ESG practices that align with stakeholder interests are generally expected to lead to reduced capital costs by mitigating risks and improving creditworthiness (Albuquerque et al., 2019; Owolabi et al., 2024). For instance, improved employee welfare can result in lower loan costs by increasing productivity and future cash flows (Carnevale & Drago, 2024). Therefore, there is an expectation that ESG factors positively affect the cost of capital

2.3.2 Pecking Order Theory

Over the past three decades, a variety of capital structure theories have been tested in a wide range of economies, including the pecking order theory. In 1984, Stewart Myers and Nicholas Majluf invented this theory (Birindelli et al., 2025). This theory says that firms prefer internal financing first, followed by debt, and external stock as a last option, prioritizing financial choices based on the cost of information asymmetry (Birindelli et al., 2025). If finance is required, this theory predicts a funding hierarchy and asserts that businesses will favour internal funding sources above external ones (Yıldırım & Çelik, 2020). Firms with better ESG practices may be more financially independent, which would lessen their need for external debt and have a negative link with leverage if ESG initiatives require a large amount of internal funding.

Due to their strong reputations and stakeholder relationships, high-ESG firms potentially have better internal financing capacity. They may prefer internal funds over debt, which would result in a more conservative financing posture and lower debt levels (Birindelli et al., 2025). With the higher ESG scores, it can reduce firms' financial requirements by increasing overall firm value and intangible assets, reducing their need for external debt

by enabling businesses to rely more on internal funding (Birindelli et al., 2025). In short, ESG factors may negatively influence the cost of capital, which shows a negative relationship between them.

2.3.3 Legitimacy Theory

The Legitimacy Theory was developed by John Dowling and Jeffrey Pfeffer in 1975, and also by Mark C. Suchman in 1995. This theory remains the most important theoretical lens in explaining the concepts of Environmental Performance and Environmental Reporting (Velte, 2023). As it discusses that firms align their operations with societal norms and expectations by engaging in social and environmental activities, such as ESG reporting, to establish and preserve legitimacy in the eyes of their stakeholders and the general public (Almaqtari et al., 2023). Firm value may be impacted by this conformance. By addressing stakeholder expectations through ESG disclosures, firms can enhance their legitimacy and even reduce their cost of capital. However, the market may sometimes fail to distinguish between ESG performance and ESG disclosure, since ESG performance is the primary indicator of successful adherence to ESG initiatives (Postiglione et al., 2024). Thus, this might show no or a mixed relationship with the cost of capital.

2.4 Empirical Review

2.4.1 ESG Performance and Cost of Capital

The relationship between ESG performance and the cost of capital is a critical area of study, with many studies looking into how a company's sustainability profile affects its financing costs. Across the findings, the cost of capital is broadly investigated through its components: the CoD and the CoE.

First of all, the dependent variable includes the cost of capital and its components. It can be broken down into the CoD and the CoE. CoD is the most frequently researched element in previous findings, and it is typically measured by a few terms (Apergis et al., 2022). For example, according to Apergis (2022), bond yields are tested to know the difference in yield between a corporate bond and a risk-free government bond (Apergis et al., 2022). Leverage is also measured by the ratio of debt to assets based on research from Birindelli (2025), which can reflect the firm's reliance on debt financing and its cost (Birindelli et al., 2025). On the other hand, the CoE is usually measured by stock returns, where the actual or risk-adjusted returns are generated by the firm's stock (Apergis et al., 2022). Besides, it is also measured by the equity risk premium through the additional return investors demand for investing in a risky asset over the risk-free rate (Postiglione et al., 2024). While systematic risk (beta) is used as well to compare the stock's volatility relative to the overall market. Higher beta implies that the cost of equity is higher (Albuquerque et al., 2019). After that, an overall measure, the WACC, which combines both the CoD and CoE, is expected to reflect the average rate of return that a firm pays to its stakeholders (Albuquerque et al., 2019).

The literature review on ESG and the cost of capital presents a mixed and contradictory picture, with results that were strongly impacted by methodology, regional context, sample characteristics, and specific ESG measures used (Cheng et al., 2025). In general, the relationship between them is negative, where many studies suggest that strong ESG performance

is associated with a lower CoD (Apergis et al., 2022). For instance, Apergis et al. (2022) found that lower bond spreads and higher bond ratings were linked to S&P 500 companies' higher ESG ratings between 2010 and 2019 (Apergis et al., 2022). This beneficial impact on bond yields was consistent across all aggregate metrics. In a similar vein, Zhao et al. (2025) discovered that from 2011 to 2022, Chinese non-financial listed companies' debt financing expenses were greatly decreased by increases in ESG performance (Zhao et al., 2025). Therefore, this aligns with the concept that by improving risk management and lowering perceived default risk, ESG improves creditworthiness. While Carnevale and Drago (2024), in a systematic literature review covering 41 empirical articles primarily on bank loans, concluded that lenders generally penalize poor ESG performance with higher loan spreads (Carnevale and Drago, 2024). Besides, some studies also show that environmental factors, particularly lower carbon emissions or higher environmental performance, lead to a lower CoD (Bertelli et al., 2025). Then, Owolabi et al. (2024) found that for G7 countries, the CoD is positively and significantly impacted by carbon risk, particularly in the wake of the Paris Agreement (2016–2020). They also showed that direct ESG factors lead to lower borrowing costs.

Secondly, ESG performance as the independent variable is assessed through various metrics. The composite ESG scores are the aggregate scores combining environmental, social, and governance factors, often obtained from rating agencies such as Refinitiv, MSCI, or KLD (Apergis et al., 2022). According to Gupta (2025), these ESG scores can be either raw (RESG) or standardized (SESG) (Gupta et al., 2025). Moreover, these ESG scores are measured individually based on the three pillars, allowing further analysis of specific sustainability dimensions (Apergis et al., 2022). To test the extent and quality of a firm’s reporting on its ESG activities and impact, the ESG disclosure and reporting are measured (Bertelli et al., 2025). Owolabi (2024) had measured certain environmental metrics by normalizing by revenue, such as carbon emissions (Scopes 1 and 2), greenhouse gas emissions, or toxic emissions (Owolabi et al., 2024). Nevertheless, there is a significant challenge in this field, which is the lack of transparency and standardization

in ESG scores (Berg et al., 2022). The methods, data sources, scopes, and weighting schemes used by different rating agencies can lead to substantial divergence in ESG scores for the same company (Hu, T., 2025). This "aggregate confusion" complicates empirical analysis, makes it challenging to assess the true ESG performance, and can introduce bias in research findings (Cheng et al., 2025).

Although there are also mixed results, the relationship between ESG and the CoE is less consistent than for the CoD (Postiglione et al., 2024). For example, according to Albuquerque et al. (2019), CSR has a negative correlation with the CoE capital and reduces systemic risk (beta) (Albuquerque et al., 2019). But in their analysis of the literature, Postiglione et al. (2024) discovered that rather than having a direct implication on firm valuation, the majority of contributions on the CoE focus on investor risk-return profiles or ESG portfolio construction (Postiglione et al., 2024). They also highlighted that many studies on the CoE are often not aimed at direct firm valuation. Additionally, Zeren et al. (2024) examined the G7 countries from February 2018 to December 2022 and, for the entire panel, found no evidence of a significant causal association between ESG scores and stock market returns (Kevser et al., 2024). Germany was the remarkable exception, where a causal relationship between stock market performance and the environmental, social, and governance sub-dimensions was discovered at a 10% significance level (Kevser et al., 2024).

H1: The negative effect of ESG performance on the cost of capital differs significantly between firms in G7 countries and firms in BRICS+ countries.

H1a: The negative effect of ESG performance on WACC differs significantly between firms in G7 countries and firms in BRICS+ countries.

H1b: The negative effect of ESG performance on the CoD differs significantly between firms in G7 countries and firms in BRICS+ countries.

H1c: The negative effect of ESG performance on the CoE differs significantly between firms in G7 countries and firms in BRICS+ countries.

2.4.2 Environmental (E), Social (S), Governance (G) Pillar and Cost of Capital

Referring to the next objective, the comprehensive ESG score, as well as individual E, S, and G pillars, can have a beneficial impact on bond yields (Apergis et al., 2022). It is important to know which pillar contributes the most to a firm's cost of capital. However, the non-uniformity of ESG metrics and scoring methodologies across different providers leads to diverse scores and relevance across industries, which can influence research outcomes and complicate comparability (Apergis et al., 2022).

H2: The negative effect of the E, S, and G pillars on the cost of capital differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2a: The negative effect of the E, S, and G pillars on the WACC differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2b: The negative effect of the E, S, and G pillars on the CoD differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2c: The negative effect of the E, S, and G pillars on the CoE differs significantly between firms in G7 countries and firms in BRICS+ countries.

By looking in depth at prior research findings related to each E, S, and G pillar and the cost of capital, the Environmental (E) pillar focuses on challenging environmental impacts through non-financial factors. Research generally indicates a significant link between environmental performance, or the risks associated with it, and the cost of capital. There are studies that suggest that borrowers with good environmental performance or low environmental risk often enjoy significant benefits, such as lower loan interest spreads (Carnevale and Drago, 2024). For instance, Apergis et al. (2022) found that the E pillar, along with S and G pillars, had a negative and significant impact on bond yields in the primary market for S&P 500

companies between 2010 and 2019 (Apergis et al., 2022). Conversely, there is a notable credit risk premium associated with carbon, greenhouse gas, or toxic emissions, according to studies. The cost of borrowing is higher for businesses that are more concerned about climate change or environmental risk. Besides, clean energy initiatives have a positive and significant linkage with ESG pillars, contributing to sustainable development in G7 economies by reducing environmental degradation like carbon intensity and emissions (Yang et al., 2022). Increased disclosure of climate change-related issues may also help mitigate carbon risk. Besides, Postiglione et al. (2024) had also shown a review study highlighting that environmental performance is inversely proportional to the CoD for Real Estate Investment Trusts (REITs), contributing to higher firm value through increased transparency. Various results may prove that the environmental pillar is negatively affecting the cost of capital, leading to lower financing costs.

H2d: The negative effect of the Environment (E) pillar on the WACC differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2e: The negative effect of the Environment (E) pillar on the CoD differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2f: The negative effect of the Environment (E) pillar on the CoE differs significantly between firms in G7 countries and firms in BRICS+ countries.

The Social (S) pillar addresses areas like workers' health and safety, diversity, and community impact through non-financial factors (Apergis et al., 2022). Past findings provide balanced and less conclusive findings regarding the inverse association of the social pillar with the cost of capital compared to the environmental pillar (Carnevale and Drago, 2024).

The expected negative relationship between the social pillar and the CoD is not conclusive, with various studies yielding different results depending on industries, datasets, and time periods (Apergis et al., 2022). Concerns about social responsibility may raise bank loan rates, according to some studies, especially when there is no security. However, Stellner et al. (2015) in

Apergis et al. (2022)'s research found only weak evidence that high CSR performance reduces risk, with the effect being dependent on the firm's country-level ESG score. During the 2008–2009 financial crisis, it was shown that corporate social capital had an impact on bond features such as spreads, principal raised, and maturities (Apergis et al., 2022). This allowed companies with strong social capital to raise more money for longer maturities and at lower spreads. Furthermore, banks typically charge lower loan rates to firms that treat their employees fairly and are satisfied with their work, while charging higher rates to businesses that are involved in unfavourable social events, such as product recalls (Carnevale and Drago, 2024). Several findings provided by Qian et al. (2023), He et al. (2021), Cheung et al. (2020), and Drago and Carnevale (2020) are consistent with the risk mitigation view: borrowers are more likely to benefit from reduced loan interest rates if they perform better socially or pose fewer social risks (Carnevale and Drago, 2024). In contrast, the social pillar is assumed to have a negative relationship with the cost of capital, where it can lead to lower borrowing costs.

H2g: The negative effect of the Social (S) pillar on the WACC differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2h: The negative effect of the Social (S) pillar on the CoD differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2i: The negative effect of the Social (S) pillar on the CoE differs significantly between firms in G7 countries and firms in BRICS+ countries.

Lastly, the governance (G) pillar incorporates aspects like corporate ethics, shareholders' rights, and executive compensation policies (Apergis et al., 2022). Research on the governance pillar is more limited than the other two pillars, and it also includes similar mixed results.

The governance pillar studies are scarce and show inconsistent findings. While certain studies suggest that stakeholder orientation can reduce borrowing costs through improved governance, others find no evidence linking the governance element of ESG to bond spreads (Apergis et al., 2022). In comparison to the environmental and social dimensions, the benefits linked to the governance factor seem to be less statistically significant. Large, listed, and rated companies' lenders may get governance data from sources other than ESG scores, diminishing the unique signal of governance scores. Moreover, there is research that shows that lower loan spreads have been linked to better governance, but primarily in more stakeholder-oriented countries. In specific institutional and economic contexts, such as the Chinese market, lower interest rate loans have been associated with higher governance performance (Carnevale and Drago, 2024). In fact, the CSR engagement can become more effective when combined with good corporate governance, based on Bae et al. (2018b)'s report. Gao et al. (2021) examined the causal relationship between stakeholder orientation and loan spreads using the staggered state-level adoption of constituency statutes by U.S. corporations, indicating a decrease in borrowing costs via the governance channel (Apergis et al., 2022). But in the same study, Amiraslani et al. (2017) found no evidence that the governance element of ESG was related to bond spreads. Based on the findings from Carnevale and Drago (2024), which included international samples and also addressed multi-dimensional ESG performance, specifically examined how borrowers' governance performance affected bank debt costs. Their results often showed that the benefits from governance were less significant or non-existent compared to environmental and social factors.

H2j: The negative effect of the Governance (G) pillar on the WACC differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2k: The negative effect of the Governance (G) pillar on the CoD differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2l: The negative effect of the Governance (G) pillar on the CoE differs significantly between firms in G7 countries and firms in BRICS+ countries.

2.4.3 Institutional Quality as Moderator

The moderating variable is also a crucial part of each study. Several studies examine the impact of various factors that moderate the relationship between ESG aspects and the cost of capital. These moderating variables can generally be categorized into institutional, firm-specific, and ESG data or reporting quality factors.

The Financial Development or Institutions Development Index is used by Birindelli et al. (2025), and they found that the relationship between ESG scores and firm leverage is negative in countries with low financial institution development, but this effect weakens or turns positive in countries with stronger financial institutions (Birindelli et al., 2025). The "Financial institutions access index" was identified as the most relevant component of this effect. To arrive at these findings, they employed two-stage least squares (2SLS) regression using instrumental factors and Propensity Score Matching (Birindelli et al., 2025). This moderating effect was investigated for the first time in this study. In addition, Kevser et al. (2024) used cross-sectional dependency, homogeneity tests, and a Konya panel causality test to examine the relationship between ESG scores and stock market performance in G7 countries (Kevser et al., 2024). They discovered no strong causal relationship in the majority of G7 countries, except for Germany, where stock markets were greatly impacted by ESG scores, perhaps as a result of sustainability regulations and required CSR/ESG practices. This indicates that national regulatory and institutional frameworks can moderate the ESG-stock market link (Kevser et al., 2024). Similarly, Almaqtari et al. (2023) highlighted regional institutional

variations by finding that European firms tend to have greater transparency levels and board features that positively contribute to environmental and ESG performance when compared to Asian corporations (Almaqtari et al., 2023). They employed both fixed and random effects in their panel data analysis. Aprt from that, Grishunin et al. (2025) compared the effect of ESG on financing costs in developed and developing nations using regression analysis and hybrid machine learning models. They discovered that developed nations had larger negative associations, which shows lower costs (Hu, T., 2025).

Other than that, using bidirectional fixed-effects panel regression models, Xiao and Xu (2025) discovered that the relationship between financial agglomeration and ESG performance is positively and considerably moderated by business size. There is a threshold effect, meaning that the benefits of financial agglomeration on ESG performance only increase when a firm reaches a specific scale (Xiao & Xu, 2025). The effectiveness of circular economy methods is also influenced by firm-specific factors such as size, governance, and digitization, according to Maquieira et al. (2024), who reviewed the research on the circular economy and default probability (Bertelli et al., 2025). According to Berg et al. (2022), there is a significant amount of disagreement between ESG ratings from various sources, mostly because of variations in measurement (56%), scope (38%), and weight (6%). They identified a "rater effect" where a rater's overall view influences specific category measurement (Berg et al., 2022). This discrepancy has the potential to change research findings and conclusions, suggesting that the methodology or ESG rating provider selection is an implicit moderator. The industrial sector and the place of incorporation inherently moderate the ESG rating construction itself, as demonstrated by Alessandro Del Vitto et al.'s (2023) discovery that Refinitiv's score system varies between sectors and countries for the E, S, and G pillars, respectively (Alessandro Del Vitto et al., 2023).

H3: Institutional quality moderates the relationship between ESG performance and the cost of capital in G7 countries and BRICS+ countries,

such that the negative effect of ESG performance is stronger in countries with higher institutional quality and stronger ESG regulatory frameworks.

H3a: Institutional quality moderates the relationship between ESG performance and the WACC in G7 countries and BRICS+ countries, such that the negative effect of ESG performance is stronger in countries with higher institutional quality and stronger ESG regulatory frameworks.

H3b: Institutional quality moderates the relationship between ESG performance and the CoD in G7 countries and BRICS+ countries, such that the negative effect of ESG performance is stronger in countries with higher institutional quality and stronger ESG regulatory frameworks.

H3c: Institutional quality moderates the relationship between ESG performance and the CoE in G7 countries and BRICS+ countries, such that the negative effect of ESG performance is stronger in countries with higher institutional quality and stronger ESG regulatory frameworks.

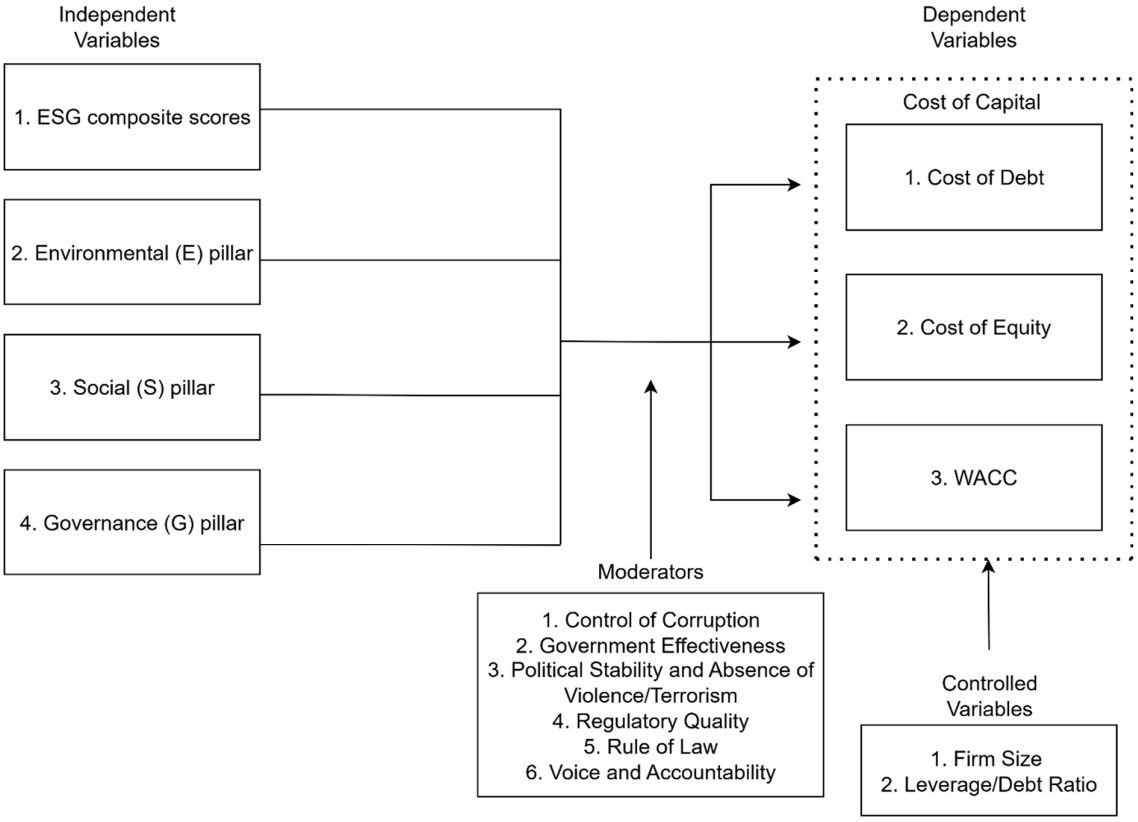
H3d: Institutional quality moderates the relationship between E, S, and G pillars and the WACC in G7 countries and BRICS+ countries, such that the negative effect of ESG performance is stronger in countries with higher institutional quality and stronger ESG regulatory frameworks.

H3e: Institutional quality moderates the relationship between E, S, and G pillars and the CoD in G7 countries and BRICS+ countries, such that the negative effect of ESG performance is stronger in countries with higher institutional quality and stronger ESG regulatory frameworks.

H3f: Institutional quality moderates the relationship between E, S, and G pillars and the CoE in G7 countries and BRICS+ countries, such that the negative effect of ESG performance is stronger in countries with higher institutional quality and stronger ESG regulatory frameworks.

2.5 Conceptual Framework

Figure 2.1 Conceptual Framework



CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodological framework adopted to examine the relationship between ESG performance and the cost of capital of firms across developed (G7) and developing (BRICS+) economies. It outlines the research design, data sources, and sampling strategy, followed by detailed descriptions of variable measurement and operationalization. The chapter also formulates the hypotheses in alignment with the research objectives and specifies the econometric models used to test them. In addition, the statistical tools and software applied in the analysis are discussed, together with the diagnostic tests and robustness checks employed to ensure the validity and reliability of the results. Overall, this chapter provides a systematic blueprint of the empirical approach undertaken, thereby laying the foundation for the presentation and interpretation of findings in the subsequent chapter.

3.2 Research Design

In order to investigate the relationship between firm-level ESG performance and the cost of capital, this study employs a quantitative research design that depends on secondary data. It is necessary to measure, test, and establish statistically significant correlations among the variables of interest to produce objective and repeatable results motivates the use of a quantitative methodology.

Using a panel data design, the study integrates cross-sectional and time-series aspects. The dataset specifically spans the years 2017–2023, allowing for the observation of firm-level variations in ESG performance and financing costs over time across multiple countries. The panel structure is particularly suitable as it enhances the robustness of the analysis by controlling for unobservable heterogeneity across firms and countries, while also improving the efficiency of statistical estimates.

The study adopts a comparative cross-country approach, focusing on the top 20 firms based on their market capitalisation from five developed (G7) economies and five developing (BRICS) economies, including the three core BRICS members and the BRICS partner countries, Malaysia and Thailand. By analysing firms across these two groups, the research design enables an assessment of whether ESG factors influence the cost of capital differently based on institutional quality and financial market maturity. This comparative perspective is crucial for addressing the research questions related to developed and developing economies, with institutional quality as the moderating role.

To conclude, this research strategy offers comprehensive, fact-based insights into the relationships between ESG performance, institutional quality, and cost of capital in many economic circumstances by combining a quantitative, panel-data approach with secondary data sources.

3.3 Data Source and Sample Selection

This research will rely on secondary data sources to ensure accuracy, comparability, and consistency across countries and companies. Financial data and ESG performance statistics at the firm level are gathered from reliable databases such as the LSEG, which was previously named Refinitiv. It provides standardized ESG ratings and detailed financial data widely used in both academic research and industry analyses. These databases also provide data on the cost of capital measures, guaranteeing measurement accuracy. The World Bank's WGI, which offers globally accepted measurements of control of corruption, government effectiveness, political stability and absence of violence/terrorism, regulatory quality, rule of law, and voice and accountability, is used to determine institutional quality indicators at the national level.

The study period is from 2017 to 2023. Firstly, this period was selected to align with the global adoption of ESG reporting after the TCFD's recommendations were published in 2017 (TASK FORCE on CLIMATE-RELATED FINANCIAL DISCLOSURES (TCFD) APPLICATION GUIDE for MALAYSIAN FINANCIAL INSTITUTIONS, n.d.), as well as subsequent regulatory developments in both developed and developing markets. Additionally, it was also selected to coincide with Bursa Malaysia's decision to mandate sustainability reporting for all listed firms, requiring them to disclose their ESG practices in annual reports starting in 2016 (Mei Ying & Ariadne, 2025). A relevant timeframe for examining the relationship between financing costs and ESG elements is provided by the inclusion of the COVID-19 period, which increased global awareness of ESG issues.

Meanwhile, the sample consists of the top 20 publicly listed firms by national stock-index market capitalization to capture large, internationally relevant firms with more consistent ESG disclosure: five developed economies from the G7 countries and five developing economies from the BRICS countries. This results in a total of 200 firms. During data collection, ESG coverage for Russia and South Africa on the LSEG (Refinitiv) platform was found to be insufficient for reliable analysis. To retain a similar sample selection and the study's emphasis on emerging-market

dynamics, Russia and South Africa were replaced with Malaysia and Thailand, respectively. This is because developed economies will have mature financial markets and stronger regulatory frameworks, while developing economies often have weaker institutions where the firms operating are voluntarily reporting their ESG disclosure, leading to different dynamics (Omeihe, 2025). Thus, contrasting rich and developing nations aids in determining whether the advantages of ESG are situation-specific or generally applicable.

Firms in the financial industry, including banks, insurance companies, and other financial institutions, are crucially excluded. It is challenging to compare them to businesses in other industries because of their unique liability structures and regulatory constraints (Owolabi et al., 2024). Research findings could be skewed if including firms in the finance and insurance industries, since the business models and regulatory frameworks differ from those of non-financial businesses (Xiao & Xu, 2025). The study isolates the effect of ESG performance on the cost of capital and ensures consistency in capital structure comparison by focusing on non-financial firms.

Five of the G7 countries, like the U.S., Germany, the U.K., Canada, and France, are commonly recognized as benchmarks for developed, advanced economies with well-established capital markets and regulatory standards, with a total contribution to the world's GDP of over 50% (Owolabi et al., 2024). On the other side, studies focused on the three member countries in BRICS, which are Brazil, India, and China. Then, Malaysia and Thailand, two partner members of BRICS, are selected as well. This is because they were considered to be "well-developed countries" compared to other emerging countries in the world. Recently, on 1 January 2025, Malaysia and Thailand were involved in the BRICS Plus mechanism, which they had officially announced as partner countries for the BRICS (Акционерное общество, 2024).

The G7 comprises established economies with developed financial markets, including the U.S., Germany, the U.K., Canada, and France. Among these, the 5 highest-ranked nations are selected based on their GDP per capita in the year 2025. According to the IMF Data Portal, this is because they represent the largest portion of the G7 group's GDP and capital markets (International Monetary Fund, 2022).

These are the equity indices, respectively: the NASDAQ Composite Index, DAX Index, FTSE 100 Index, S&P Composite, and CAC 40 Index (Shaikh et al., 2021). Compared to the selected five, the remaining two G7 countries, Japan and Italy, have smaller market sizes and limited influence in global capital markets. Therefore, choosing the top 5 maintains feasibility while guaranteeing representativeness.

Meanwhile, the BRICS nations are widely acknowledged as a standard and important group that represents developing countries or significant emerging markets, especially in research and international economic talks (Wen, J. et al, 2025). Furthermore, the ASEAN-5, which consists of Malaysia and Thailand, is defined in the IMF workpaper about topics including trade, financial integration, and regulatory frameworks across these economies are examined (Baek et al., 2023). Besides, these countries have their active stock exchanges that list large-cap companies with accessible ESG data, such as the Bovespa Index for Brazil, the BSE Sensex Index for India, the SSE Composite Index for China, the FTSE Bursa Malaysia KLCI for Malaysia, and the SET 50 Index for Thailand. This approach ensures that the sample is made up of large, financially significant firms that tend to have consistent ESG reporting, comprehensive financial reporting, also active participation in global capital markets.

3.4 Variable Measurement and Operationalization

3.4.1 Dependent Variable: Cost of Capital

The cost of capital for the company is the dependent variable, which represents the required return investors demand to provide financing. All of the data will be obtained from the London Stock Exchange Group (LESG).

3.4.1.1 Cost of Debt (Kd)

This variable is the most frequently used variable in the findings to measure the financial effects of ESG and carbon risks (Carnevale and Drago, 2024). It is a direct, quantifiable measure of the premium that lenders charge borrowers to compensate for the risk of default. Lenders frequently view companies with low ESG scores or high carbon risk as risky (Owolabi et al., 2024). These dangers increase the possibility of default, possible liabilities, punishment from the authorities, interruptions to operations, and harming others' reputation (Apergis et al., 2022). For example, firms may face costly penalties for environmental violations or damage claims, and in the case of bankruptcy, these liabilities may outweigh debt holders' claims (Apergis et al., 2022). Thus, lenders are assumed to demand higher loan and bond rates to compensate for this elevated risk. This makes the CoD an excellent dependent variable to test whether capital markets are pricing in ESG-related risks (Apergis et al., 2022).

Several studies use the newly issued bonds' yield spread over a corresponding risk-free treasury bond as a direct market-quoted measure of the CoD (Apergis et al., 2022). Because it captures the premium the market prices for default risk at the time of issue, this strategy is beneficial. However, this data is often limited to new issuances and may not be available for all firms in a given year, especially in studies covering a broad, international sample that includes unlisted firms or firms that do not frequently issue bonds (Carnevale and Drago, 2024). Some studies also analyse the interest rates or spreads on bank loans (Carnevale and Drago, 2024). While this provides a market-based view, comprehensive data on loan terms for all firms, especially bilateral loans to smaller or unlisted companies, is often proprietary and not easily accessible for large-scale empirical research.

3.4.1.2 Cost of Equity (Ke)

The return needed by shareholders to offset the risk of participating in a business is known as the CoE. Since a company's systemic risk (beta) is believed to be influenced by its performance on ESG, it is justified as a dependent variable (Albuquerque et al., 2019). One key theory posits that strong ESG performance, particularly through product differentiation, insulates firms from aggregate economic shocks. This is because demand becomes less price-elastic when consumers are loyal to sustainable products, which results in more steady earnings (Albuquerque et al., 2019). When profits remain steady, systematic risk (beta) decreases, lowering the equity costs as calculated by models like the CAPM. The CoE makes sense as a dependent variable to determine whether ESG performance reduces a firm's sensitivity to market-wide risks (Albuquerque et al., 2019).

It is important to specify that for this cross-country study, which includes both developed and developing economies, a global or international version of the CAPM is considered more appropriate than a local CAPM. The choice of a global or international CAPM is justified as it better reflects the perspective of a diversified global investor, which is particularly relevant in a study spanning multiple integrated economies (Albuquerque et al., 2019). The globe's capital markets are very interconnected in an increasingly globalized society. Investors, especially those in institutions, frequently have portfolios that are globally diversified and do not confine their investments to a domestic market (Grishunin et al., 2023). A global CAPM aligns with this reality by assessing a firm's systematic risk relative to the global market portfolio rather than just a local one (Albuquerque et al., 2019). This is crucial for a study involving the G7 and other nations, ensuring that the risk premium for each firm

is benchmarked against a common global standard (Postiglione et al., 2024).

3.4.1.3 Weighted Average Cost of Capital (WACC)

WACC is frequently used to quantify the overall capital costs, which include the debt and equity costs. Being a key component of firm valuation models and providing a thorough evaluation of a firm's financing costs, it is justified as a dependent variable (Postiglione et al., 2024). As ESG performance can affect both debt and equity costs through default and systemic risk, respectively, the WACC offers a comprehensive statistic to assess the total impact on a firm's financing costs. (Postiglione et al., 2024). The financial gains from ESG activities are mostly dependent on a reduced cost of capital, since it directly correlates with a greater firm value (Carnevale and Drago, 2024). In discounted cash flow models, a crucial element in assessing a company's worth is its cost of financing. Future cash flows have a higher net present value when the WACC is lower. Thus, researchers can directly test the claim that improved ESG performance increases company value by lowering its total risk profile by utilizing WACC as a dependent variable (Postiglione et al., 2024).

3.4.2 Independent Variables: ESG Performances

The three ESG ratings serve as a proxy for firm-level ESG performance, which is the primary explanatory variable. Similar to the sources obtained for the dependent variable, the LESG database, which aggregates publicly available data and normalizes it into standardized ESG scores (0–100), is the source of all ESG metrics.

3.4.2.1 ESG Composite Score

The composite ESG score serves as a thorough, all-encompassing indicator of a company's commitment to sustainability and its ability to control non-financial risks (Apergis et al., 2022). By combining data from all three pillars, the combined ESG score offers a comprehensive assessment of a business's overall sustainability performance. This makes it a useful independent variable for testing the aggregate impact of a firm's sustainability efforts on financial outcomes like the CoD or firm value (Apergis et al., 2022).

3.4.2.2 Individual ESG Pillars

There are three individual ESG pillars, which consist of:

1. **Environmental Score (E)**

   Particularly in light of climate change and stricter laws, the "E" pillar is sometimes regarded as the one with the most correlation to financial risk (Apergis et al., 2022). It records how a company handles the risks of transitions and physical dangers. Firms that have poor environmental performance are expected to face higher compliance costs, regulatory penalties, and potential liabilities, which increases their credit risk (Apergis et al., 2022). Therefore, the Environmental Score is a justified independent variable for predicting changes in the CoD (Owolabi et al., 2024).

2. **Social Score (S)**

   The "S" pillar measures a firm's management of relationships with its workforce, customers, and community (Carnevale and Drago, 2024). Inadequate social performance can result in labor

disputes, diminished consumer loyalty, and reputational harm, all of which can lower a company's value and raise the risk of default (Apergis et al., 2022). Furthermore, it is anticipated that improved employee happiness and treatment will boost output and increase future cash flows. Studies use the S score to test whether factors like fair employee treatment or employee satisfaction are negatively correlated with the cost of bank loans (Carnevale and Drago, 2024).

3. **Governance Score (G)**

The "G" pillar is crucial because it relates to the quality of a firm's management and its ability to protect stakeholder interests (Carnevale and Drago, 2024). Good governance guarantees that ESG initiatives are in line with value creation and can protect lenders from the possibility of "overinvestment" in CSR projects that could lower the company's value. Strong governance is often seen as a prerequisite for effective E and S performance. A well-governed firm is more likely to implement and monitor its environmental and social policies effectively (Carnevale and Drago, 2024). Information like management quality that is already partially included in traditional credit ratings is frequently captured by the G pillar. Hence, isolating the G score helps researchers understand its standalone contribution and its interaction with credit risk assessments (Apergis et al., 2022).

3.4.3 Controlled Variable

3.4.3.1 Firm Size

Firm size is an essential control variable as it is strongly correlated with the company's financial structure, risk profile, operational efficiency, and ESG disclosure practices (Carnevale and Drago, 2024). In addition to having more diversified operations, which can lower their systematic risk, larger companies are typically thought to have a lower failure rate (Owolabi et al., 2024). They can respond more effectively to available opportunities, such as those presented by financial agglomeration, as they possess more financial resources and commercial power. Besides, they can better afford the costs of ESG projects as well (Xiao & Xu, 2025).

The findings on the empirical relationship between firm size and the company's financing costs have shown different results. For instance, the study from Owolabi et al. found that larger firms tend to have higher debt costs, while another study found a negative effect on bond yields (Apergis et al., 2022). This emphasizes how crucial it is to include it as a control in order to appropriately characterize the model.

3.4.3.2 Leverage

Leverage is one of the most crucial measures of a company's capital structure and financial risk, which is typically determined by dividing total debt by total assets. It is controlled because it directly impacts a firm's CoD and its capacity for future investments, including in ESG initiatives (Owolabi et al., 2024). Higher leverage implies greater debt obligations by the firms, which can increase

their probability of defaulting (Apergis et al., 2022). In order to offset this heightened risk, lenders and investors are anticipated to demand a higher CoD for highly leveraged enterprises (Owolabi et al., 2024). Leverage decisions may serve as a signal to external investors about a company's quality, according to theories of corporate finance (Birindell et al., 2025). Pecking order theory suggests that a higher ESG score may be linked to lower debt levels, whilst signaling theory suggests that taking on more debt implies confidence in future cash flows (Birindell et al., 2025). Hence, controlling for leverage helps to disentangle these complex theoretical relationships.

3.4.4 Moderating Variable: Institutional Quality

Institutional quality is expected to moderate the impact of ESG performance on the cost of capital. It is measured using the WGI, which includes six institutional dimensions, and a composite institutional quality index will be constructed by averaging the six dimensions for each country-year. In the research from Nguyen, A. et al in 2022, the authors combine three selected indicators from the WGIs, due to the three core indicators are highly correlated.

1. Voice & Accountability
2. Political Stability
3. Government Effectiveness
4. Regulatory Quality
5. Rule of Law
6. Control of Corruption

In nations with strong governments and excellent regulations, ESG disclosures are more credible and transparent (Carnevale and Drago, 2024). For instance, a firm's commitment to reducing carbon emissions is more meaningful in a country that strictly enforces its environmental laws (Apergis et al., 2022). In such circumstances, lenders are more willing to reward strong ESG performance with reduced loan spreads since they may trust that the company's actions are genuine and consistent with the country's environmental goals.

Meanwhile, with a strict rule of law and control of corruption, it ensures that ESG pledges are truly incorporated into business strategy and are not just "greenwashing" or the product of managerial opportunism (Carnevale and Drago, 2024). Lenders are more likely to view ESG initiatives as value-creating rather than value-destroying in well-governed countries, where legal frameworks protect against fraud and ensure corporate transparency (Carnevale and Drago, 2024). In environments with a weak rule of law or high corruption, even a firm with a high ESG score may be viewed with scepticism by investors (Işık et al., 2024). The institutional weakness around the firm erodes the credibility of its disclosures. Therefore, a country's ability to control corruption moderates the effect, making the performance of a firm on ESG a more reliable signal of lower risk in less corrupt countries.

Besides, politically stable countries provide a more predictable operating environment, which reduces a firm's overall risk profile (Işık et al., 2024). The benefits of good ESG performance, such as long-term stakeholder relationships and sustainable investments, are more likely to materialize in a stable political climate. However, political unrest has the potential to sabotage these long-term projects, which would reduce the value of ESG activities to lenders. Countries with high "Voice and Accountability" frequently have more engaged media, civil society, and other stakeholders who put pressure on businesses to enhance their ESG performance (Carnevale and Drago,

2024). Additionally, Carnevale and Drago's study demonstrated that reduced loan spreads are linked to improved governance, but frequently only in nations that prioritize stakeholders. Thus, the financial gains from ESG are moderated by the stakeholder context and country culture.

Table 3.1 Summarization of Variable Definitions and Proxies

Variable Type	**Variable**	**Definition / Proxy**	**Source**
DV	WACC	Weighted average of the CoE and the after-tax CoD	LSEG Database
	Cost of Equity (Ke)	CAPM Model	LSEG Database
	Cost of Debt (Kd)	Interest expense / total debt	LSEG Database
IV	ESG Composite Score	Aggregated ESG score (0–100)	LSEG Database
	Environmental Score	Firm's environmental performance score	LSEG Database
	Social Score	Firm's social performance score	LSEG Database
	Governance Score	Firm's governance performance score	LSEG Database
Moderating Variable	Institutional Quality	Average of six WGI indicators	Worldwide Governance Indicators (WGI)
Control Variable	Firm Size	Natural log of total assets	LSEG Database
	Leverage	Total debt / total assets	LSEG Database

3.5 Formulation of Hypotheses

H1: The negative effect of ESG performance on the cost of capital differs significantly between firms in G7 countries and firms in BRICS+ countries.

H1a: The negative effect of ESG performance on the WACC differs significantly between firms in G7 countries and firms in BRICS+ countries.

H1b: The negative effect of ESG performance on the CoD differs significantly between firms in G7 countries and firms in BRICS+ countries.

H1c: The negative effect of ESG performance on the CoE differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2: The negative effect of the E, S, and G pillars on the cost of capital differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2a: The negative effect of the E, S, and G pillars on the WACC differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2b: The negative effect of the E, S, and G pillars on the CoD differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2c: The negative effect of the E, S, and G pillars on the CoE differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2d: The negative effect of the Environment (E) pillar on the WACC differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2e: The negative effect of the Environment (E) pillar on the CoD differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2f: The negative effect of the Environment (E) pillar on the CoE differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2g: The negative effect of the Social (S) pillar on the WACC differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2h: The negative effect of the Social (S) pillar on the CoD differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2i: The negative effect of the Social (S) pillar on the CoE differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2j: The negative effect of the Governance (G) pillar on the WACC differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2k: The negative effect of the Governance (G) pillar on the CoD differs significantly between firms in G7 countries and firms in BRICS+ countries.

H2l: The negative effect of the Governance (G) pillar on the CoE differs significantly between firms in G7 countries and firms in BRICS+ countries.

H3: Institutional quality moderates the relationship between ESG performance and the cost of capital in G7 countries and BRICS+ countries, such that the negative effect of ESG performance is stronger in countries with higher institutional quality and stronger ESG regulatory frameworks.

H3a: Institutional quality moderates the relationship between ESG performance and the WACC in G7 countries and BRICS+ countries, such that the negative effect of ESG performance is stronger in countries with higher institutional quality and stronger ESG regulatory frameworks.

H3b: Institutional quality moderates the relationship between ESG performance and the CoD in G7 countries and BRICS+ countries, such that the negative effect of ESG performance is stronger in countries with higher institutional quality and stronger ESG regulatory frameworks.

H3c: Institutional quality moderates the relationship between ESG performance and the CoE in G7 countries and BRICS+ countries, such that the negative effect of ESG performance is stronger in countries with higher institutional quality and stronger ESG regulatory frameworks.

H3d: Institutional quality moderates the relationship between E, S, and G pillars and the WACC in G7 countries and BRICS+ countries, such that the negative effect of ESG performance is stronger in countries with higher institutional quality and stronger ESG regulatory frameworks.

H3e: Institutional quality moderates the relationship between E, S, and G pillars and the CoD in G7 countries and BRICS+ countries, such that the negative effect of ESG performance is stronger in countries with higher institutional quality and stronger ESG regulatory frameworks.

H3f: Institutional quality moderates the relationship between E, S, and G pillars and the CoE in G7 countries and BRICS+ countries, such that the negative effect of ESG performance is stronger in countries with higher institutional quality and stronger ESG regulatory frameworks.

3.6 Statistical Model

3.6.1 Overview

The impact of ESG performance on a firm's financing costs is examined in this study using panel data regression models across the five G7 countries and BRICS countries over the period 2017–2023. Panel regressions enable the control of unobserved variability over time and between firms. The primary estimation method will be fixed-effects (FE) regression at the firm level, with year dummies to capture common macroeconomic shocks. The FE approach is preferred given that firm-specific factors are likely correlated with ESG performance. Robustness will be checked with random-effects (RE) models, and the decision between FE and RE will be guided by the Hausman test.

To account for autocorrelation and heteroskedasticity, all standard errors will be grouped at the firm level. Two-way clustering at the business and

national levels will be taken into consideration when interaction terms involve variables at the country level.

3.6.2 Model for Hypothesis 1

$$CostOfCapital_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 Region_c + \beta_3 (ESG_{it} \times Region_c) + \beta_4 Controls_{it} + \mu_i + \lambda_t + \epsilon_{it}$$

Where:

Dependent Variable (Cost Of Capital *i,t*)

- For **H1a:** Weighted Average Cost of Capital (WACC) of firm *i* in year *t*.
- For **H1b:** CoD of firm *i* in year *t*.
- For **H1c:** CoE of firm *i* in year *t*.

Independent Variable

- ESG *i,t*: ESG performance score of firm *i* in year *t*.

Moderator (Regional Dummy)

- Region *c*: Dummy variable that equals 1 if firm *i* is located in a G7 country, and 0 if located in a BRICS country.

Interaction Term

- (ESG *i,t* × Region *c*): Captures whether the effect of ESG performance on cost of capital differs significantly between G7 and BRICS firms.
- A significant coefficient (β3\beta_3β3) would confirm H1.

Control Variables (Controls *i,t*)

- Firm Size (log of total assets).
- Leverage / Debt Ratio.

- Industry and country-year dummies can also be added to absorb fixed effects.

Fixed Effects

- μi: Firm fixed effects, controlling for time-invariant firm characteristics.
- λt: Year fixed effects, controlling for global shocks

Error Term

- $\epsilon i,t$: Error term. Standard errors will be clustered at the firm level (and two-way clustering used when moderation is introduced at the country level).

3.6.3 Model for Hypothesis 2

$$\text{CostOfCapital}_{it} = \beta_0 + \beta_1 E_{it} + \beta_2 S_{it} + \beta_3 G_{it} + \beta_4 Region_c + \beta_5 (E_{it} \times Region_c)$$

$$+ \beta_6 (S_{it} \times Region_c) + \beta_7 (G_{it} \times Region_c) + \beta_8 Controls_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

- Cost *i,t* = dependent variable for firm *i* at year *t*.

Use this model three times (separately) for the three outcomes:

H2a: Cost *i,t* = WACC *i,t*

H2b: Cost *i,t* = CoD *i,t*

H2c: Cost *i,t* = CoE *i,t*

- E *i,t* = Environmental pillar score (firm *i,* year *t*).
- Region *c* = regional dummy for country *c*: 1 = G7, 0 = BRICS+.
- E *i,t* ×Region *c* = interaction term

- X*i,t* = vector of control variables
- μ*i*= firm fixed effects (controls for time-invariant firm heterogeneity).
- λ*t*= year fixed effects (controls for common time shocks such as global regulation changes or COVID).
- ε *i,t* = idiosyncratic error term.

$$\text{Cost}_{it} = \beta_0 + \beta_1 E_{it} + \beta_2 \text{Region}_c + \beta_3 \left(E_{it} \times \text{Region}_c\right) + \gamma' X_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

Where:

- Cost *i,t* = dependent variable for firm *i* at year *t*.

H2d: Cost *i,t* = WACC *i,t*

H2e: Cost *i,t* = CoD *i,t*

H2f: Cost *i,t* = CoE *i,t*

- E *i,t* = Environment pillar score (firm *i,* year *t*).
- Region *c* = regional dummy for country *c*: 1 = G7, 0 = BRICS+.
- E *i,t* ×Region *c* = interaction term
- X*i,t* = vector of control variables
- μ*i*= firm fixed effects (controls for time-invariant firm heterogeneity).
- λ*t*= year fixed effects (controls for common time shocks such as global regulation changes or COVID).
- ε *i,t* = idiosyncratic error term.

$$\text{Cost}_{it} = \beta_0 + \beta_1 S_{it} + \beta_2 Region_c + \beta_3 (S_{it} \times Region_c) + \boldsymbol{\gamma}' \mathbf{X}_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

Where:

- Cost *i,t* = dependent variable for firm *i* at year *t*.

H2g: Cost *i,t* = WACC *i,t*

H2h: Cost *i,t* = CoD *i,t*

H2i: Cost *i,t* = CoE *i,t*

- S *i,t* = Social pillar score (firm *i,* year *t*).
- Region *c* = regional dummy for country *c*: 1 = G7, 0 = BRICS+.
- E *i,t* ×Region *c* = interaction term
- X*i,t* = vector of control variables
- μ*i*= firm fixed effects (controls for time-invariant firm heterogeneity).
- λ*t*= year fixed effects (controls for common time shocks such as global regulation changes or COVID).
- ε *i,t* = idiosyncratic error term.

$$\text{Cost}_{it} = \beta_0 + \beta_1 G_{it} + \beta_2 Region_c + \beta_3 (G_{it} \times Region_c) + \boldsymbol{\gamma}' \mathbf{X}_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

- Cost *i,t* = dependent variable for firm *i* at year *t*.

H2j: Cost *i,t* = WACC *i,t*

H2k: Cost *i,t* = CoD *i,t*

H2l: Cost *i,t* = CoE *i,t*

- G *i,t* = Government pillar score (firm *i,* year *t*).
- Region *c* = regional dummy for country *c*: 1 = G7, 0 = BRICS+.
- E *i,t* ×Region *c* = interaction term

- X*i,t* = vector of control variables
- μ*i*= firm fixed effects (controls for time-invariant firm heterogeneity).
- λ*t*= year fixed effects (controls for common time shocks such as global regulation changes or COVID).
- ε *i,t* = idiosyncratic error term.

3.6.4 Model for Hypothesis 3

$$Cost_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 InstQual_{ct} + \beta_3 (ESG_{it} \times InstQual_{ct}) + \boldsymbol{\gamma}' \mathbf{X}_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

- Cost *i,t* = dependent variable for firm *i* at year *t*.
- ESGitESG_{it}ESGit: ESG score for firm i in year t.
- InstQual *ct*: Institutional quality index for country c in year t, built from the six WGIs.
- ESG *it* × InstQual *ct*: Interaction term — captures whether the impact of ESG on cost of capital is stronger in countries with higher institutional quality.
- X*i,t* = vector of control variables
- μ*i*= firm fixed effects (controls for time-invariant firm heterogeneity).
- λ*t*= year fixed effects (controls for common time shocks such as global regulation changes or COVID).
- ε *i,t* = idiosyncratic error term.

3.6.7 Software and Tools

All statistical analyses in this study will be conducted using Stata, a widely recognized software package for econometric and panel data analysis. Stata provides robust tools for estimating fixed-effects and random-effects regressions, testing model assumptions, and performing advanced panel data techniques such as instrumental variable regression and generalized method of moments. The software also allows the inclusion of firm-level and time fixed effects, clustering of standard errors to address heteroskedasticity and autocorrelation, and the implementation of interaction terms to test moderation effects. Furthermore, diagnostic tests such as the Hausman specification test, multicollinearity checks (VIF), and robustness estimations can be performed directly within Stata, making it an appropriate and efficient tool for this research.

3.7 Data Analysis Plan

3.7.1 Steps in Data Analysis

The data analysis will proceed in several stages to ensure a comprehensive understanding of the relationship between ESG performance and the cost of capital. First, descriptive statistics will be presented to summarize the main characteristics of the dataset, including measures of central tendency and dispersion for all dependent, independent, and control variables. This will be followed by correlation analysis to provide preliminary insights into the associations among variables and to detect any potential multicollinearity concerns.

Next, panel data regression models will be estimated to formally test the hypotheses. The baseline regressions will examine the effect of the ESG composite score on different measures of the cost of capital, including the

WACC, CoD, and CoE. Subsequent models will incorporate the disaggregated Environmental, Social, and Governance (E, S, and G) pillars to identify their individual contributions. Finally, interaction terms will be included to test the moderating effects of institutional quality and ESG regulatory frameworks.

Data Analysis Plan Flowchart

Step 1: Data Preparation

- Collect secondary data (firm-level ESG scores, cost of capital components, control variables, institutional quality indicators).
- Clean and organize panel dataset (2017–2023).
- If required, standardize variables to lessen the impact of outliers.

Step 2: Descriptive Analysis

- Summary statistics (mean, median, min, max, standard deviation).
- Distributional checks of ESG scores and cost of capital measures.

Step 3: Correlation Analysis

- Pairwise correlations among ESG (composite and pillars), cost of capital, and controls.
- Initial multicollinearity assessment.

Step 4: Baseline Panel Regression (H1a–c)

- Regress ESG composite on WACC, CoD, CoE.
- Firm fixed effects + year fixed effects.

Step 5: Pillar-Level Analysis (H2a–i)

- Separate regressions with Environmental, Social, and Governance scores.
- Assess individual pillar impacts on financing costs.

Step 6: Moderation Analysis (H3)

- Interaction terms: ESG × Institutional Quality, ESG × Regulatory Strength.
- Test moderating effects in G7 vs BRICS+.

Step 7: Diagnostic Tests

- Hausman test (FE vs RE).
- Variance Inflation Factor (VIF) for multicollinearity.
- Check heteroskedasticity and autocorrelation.
- Clustered standard errors (firm-level, and possibly two-way firm-country).

Step 8: Robustness Checks

- Alternative measures of CoD and CoE.
- Lagged ESG scores to address reverse causality if required.
- Sub-sample regressions (G7 vs BRICS).

Step 9: Results Interpretation and Hypothesis Testing

- Compare findings across models.
- Evaluate whether hypotheses are supported.
- Discuss implications for developed vs developing economies.

3.7.2 Diagnostic Tests

To ensure the robustness of results, several diagnostic tests will be conducted. The Hausman specification test will be applied to determine whether fixed-effects or random-effects estimation is more appropriate. Additionally, the multicollinearity among explanatory variables, namely between the E, S, and G pillars, will be evaluated using the Variance Inflation Factor (VIF) analysis. Clustered standard errors at the firm level will also be used to address heteroskedasticity and autocorrelation, and two-way clustering by firm and nation will be employed when necessary.

A significant econometric challenge in determining the relationship between ESG performance and the cost of capital is the issue of endogeneity. This issue can arise if a common, unobserved factor influences both a company's ESG score and cost of capital, or if there is reverse causality between the two variables (Owolabi et al., 2024). Reverse causality is a particular concern in this context. However, the main idea is that a reduced cost of capital results from improved ESG performance; it is also possible that the link operates oppositely (Birindelli et al., 2025). For example, companies with a lower cost of capital and more financial resources or "financial slack" tend to be more lucrative (Cheng et al., 2025). These firms may more readily afford to engage heavily in long-term ESG projects, such as implementing green technology or enhancing worker welfare. Though the causal relationship would go from the lower cost of capital to the higher ESG score rather than the other way around, this might result in an observable correlation where high ESG scores are linked to a low cost of capital. If not addressed, this endogeneity can lead to biased and inconsistent estimates (Albuquerque et al., 2019).

3.8 Summary

This chapter outlines the methodological framework employed to examine the impact of ESG performance on the cost of capital across firms in G7 and BRICS countries. The research design employs a quantitative approach, utilizing secondary panel data from 2017 to 2023, with a sample comprising the top 20 publicly listed companies by market capitalization in the selected 10 countries. The key variables of interest include firm-level ESG scores and their environmental, social, and governance pillars as independent variables, the WACC, CoD, and CoE as dependent variables, and institutional quality and ESG regulatory strength as moderating factors. Then, control variables are also implemented to account for fundamental firm-specific characteristics such as the firm size, debt ratio, and profitability.

Apart from that, this chapter further developed the research's hypotheses, linking them directly to statistical models based on panel regression techniques. Diagnostic tests will be conducted to ensure the robustness of results if needed. Interaction models are used to test the moderating role of institutional quality and ESG regulations. The data analysis plan details the step-by-step procedure, beginning with descriptive and correlation analyses, followed by regression models, diagnostic tests, and robustness checks.

CHAPTER 4: RESULTS AND FINDINGS

4.1 Introduction

This chapter presents the empirical results obtained from the analysis of the relationship between firms' ESG performance and their cost of capital across G7 and BRICS countries. The chapter begins with descriptive statistics to provide an overview of the distributional characteristics of the variables used in the study. This is followed by a correlation analysis to examine the linear relationships between the independent, moderating, and dependent variables.

Next, several diagnostic tests are conducted to ensure that the panel data model satisfies the necessary statistical assumptions. These include tests for autocorrelation, heteroskedasticity, and model specification, as well as the Hausman test to determine the appropriateness of using either a fixed effects or random effects estimator.

Following the diagnostic checks, the chapter presents the regression results for the main research models, including the moderating role of institutional quality in the ESG–cost of capital relationship. The findings from each model are interpreted in detail. Subsequently, each research hypothesis is evaluated based on the regression outcomes.

The chapter concludes with a summary of the key empirical findings and how they relate to the objectives of the study.

4.2 Descriptive Statistics

Table 4.1 Descriptive Analysis

Variables	Observations	Mean	Median	Standard Deviation	Minimum	Maximum
WACC	1,400	0.0552	0.0442	0.2295	-0.4982	8.5524
Cost of Debt	1,400	0.0486	0.0345	0.1419	-0.1016	3.1583
Cost of Equity	1,400	0.0641	0.0594	0.0337	-0.0030	0.2239
ESG Composite	1,400	1.8086	1.8518	0.1612	0.5328	1.9805
Environment	1,400	1.7746	1.8461	0.2576	-0.3098	1.9918
Social	1,400	1.8266	1.8832	0.1866	0.3054	1.9902
Governance	1,400	1.7644	1.8218	0.1929	0.5403	1.9952
Region	1,400	1.5	1.5	0.5002	1	2
Institutional Quality	1,400	66.4011	70.7201	20.3519	39.4708	94.8987
Firm Size	1,400	11.8000	11.8830	1.3512	7.8697	15.2990
Leverage	1,400	0.2818	0.2830	0.1667	-0.0009	0.9830

The descriptive statistics presented in Table 4.2 provide an overview of the central tendencies and dispersion of the variables used in this study across 1,400 firm-year observations. Overall, the dependent variables show significant variation in the sample firms' capital structure and financing circumstances. The distribution is slightly tilted to the right, with a mean weighted average cost of capital (WACC) of 0.0552 and a median of 0.0442. A subset of businesses with abnormally high capital costs could be the cause of this skew. Significant variation in WACC across enterprises is further confirmed by the comparatively large standard deviation (0.2295), which is consistent with variations in industry characteristics, risk exposure, and geographic institutional settings. A similar pattern is observed for the CoD, which averages 0.0486, with a lower standard deviation (0.1419), indicating less dispersion relative to the overall cost of capital. The CoE remains the highest among the three financing metrics, averaging 0.0641, reflecting the inherently greater risk premium demanded by equity holders. Its minimum and maximum

values indicate that some firms face extremely low equity costs, while others experience substantially elevated equity risk.

Regarding the ESG-related factors, the findings show that firms' sustainability performance is generally solid and consistent. With a mean of 1.8086 and a standard deviation of 0.1612, the composite ESG score shows little variability, indicating that the sampled firms typically uphold consistent ESG norms. With mean scores of 1.7746, 1.8266, and 1.7644, respectively, the individual pillar scores—environmental, social, and governance—follow a similar pattern. The social pillar has the highest average value of the three pillars, meaning that businesses typically score marginally higher on social activities than on environmental or governance policies. The limited dispersion across all three pillars suggests that businesses' ESG initiatives typically fall into a very small performance range. The reliability of the ESG scoring distribution is further supported by the minimum and maximum values, which show that although there is significant variation in ESG performance, there are no severe outliers.

With a mean of 1.5 and a standard deviation of 0.50, the region variable, which is coded as 1 for G7 firms and 2 for BRICS firms, shows an equal distribution of businesses from developed and emerging economies. Regional impacts in the regression analysis are more comparable because of this balanced division. The Institutional Quality Index, which has a mean of 66.40 and a somewhat large standard deviation of 20.35, indicates that institutional conditions also differ significantly. The broad range—roughly 39 to 95—captures the institutional differences between G7 and BRICS+ countries, providing a suitable foundation for evaluating moderating effects associated with institutional strength. Meanwhile, the average firm size is 11.80, with a moderate standard deviation of 1.3512. This indicates that the sample largely consists of medium to large firms, consistent with the fact that ESG-related disclosures and datasets are typically more available for larger, publicly traded corporations. The leverage ratio, with a mean of 0.2818, indicates that businesses typically use debt to fund about 28% of their capital. Although most businesses tend to keep their leverage levels within a similar range, the relatively moderate standard deviation (0.1667) shows considerable variation in capital structure decisions.

4.3 Correlation Analysis

Correlation analysis was conducted to examine the strength and direction of the relationships among the key variables used in this study, including the cost of capital measures, ESG performance indicators, institutional quality, and firm-level controls. This analysis provides an initial understanding of how the variables move together and helps identify potential multicollinearity issues before running the regression models.

4.3.1 Basic Pearson Correlation Matrix

Table 4.2 Basic Pearson Correlation Matrix

	WACC	**Cost of Debt**	**Cost of Equity**	**ESG Composite**	**Environment**	**Social**	**Governance**
WACC	1.0000						
Cost of Debt	0.0162 (0.5445)	1.0000					
Cost of Equity	0.1027* (0.0001)	0.0553* (0.0386)	1.0000				
ESG Composite	0.0024 (0.9298)	-0.0143 (0.5918)	-0.0782* (0.0034)	1.0000			
Environment	-0.0071 (0.7904)	-0.0141 (0.5979)	-0.0869* (0.0011)	0.8308* (0.0000)	1.0000		
Social	0.0047 (0.8616)	0.0088 (0.7419)	-0.0811* (0.0024)	0.8762* (0.0000)	0.7426* (0.0000)	1.0000	
Governance	0.0139 (0.6036)	-0.0411 (0.1245)	-0.0351 (0.1893)	0.6945* (0.0000)	0.4342* (0.0000)	0.5096* (0.0000)	1.0000
Region	0.0639* (0.0168)	0.0537* (0.0446)	0.3554* (0.0000)	-0.3119* (0.0000)	-0.2446* (0.0000)	-0.2496* (0.0000)	-0.2860* (0.0000)
Institutional Quality	-0.0734* (0.0060)	-0.0416 (0.1202)	-0.4141* (0.0000)	0.2923* (0.0000)	0.2150* (0.0000)	0.2323* (0.0000)	0.2859* (0.0000)

Firm Size	-0.0009 (0.9727)	-0.1025* (0.0001)	-0.2659* (0.0000)	0.3735* (0.0000)	0.3427* (0.0000)	0.3119* (0.0000)	0.2563* (0.0000)
Leverage	-0.0275 (0.3041)	-0.1402* (0.0000)	-0.0872* (0.0011)	-0.0292 (0.2747)	-0.0686* (0.0103)	-0.0294 (0.2715)	0.0283 (0.2895)

The correlation matrix in Table 4.3 offers preliminary information about the bivariate relationships between the study's variables. The overall modest correlations between ESG-related variables and the cost-of-capital measures indicate that, at the descriptive level, ESG characteristics may not have substantial linear associations with capital costs.

The CoE and WACC have a substantial positive association (r = 0.1027), supported by its p-value of 0.0001, suggesting that companies with higher equity costs typically have higher total capital costs. In a similar vein, the CoD and CoE have a small but significant correlation (r = 0.0553 with p-value of 0.0386), indicating some co-movement between the two financing costs. Nevertheless, there is no substantial correlation between WACC and CoD, indicating that debt costs alone do not explain variation in WACC across firms.

There is a tiny but significant negative correlation (r = –0.0782, and p-value less than 0.01) between the CoE and the ESG composite score, suggesting that firms with better overall ESG performance are associated with slightly lower equity financing costs. The environmental pillar (r = –0.0869, p-value less than 0.01) and the social pillar (r = –0.0811, p-value less than 0.01) show similar negative associations, which implies that improvements in environmental and social practices may contribute to lower perceived equity risk. There is a lack of a substantial correlation between governance scores and cost of capital, indicating that governance alone may not directly influence capital market pricing at the bivariate level. As anticipated and proven by the coefficient and p-values, there is a strong and substantial correlation between the three pillars, indicating their joint contribution to the ESG composite score.

Meanwhile, the CoE ($r = 0.3554$, $p < 0.01$) and WACC ($r = 0.0639$, $p < 0.05$) have substantial positive correlations with the region dummy, indicating that BRICS firms (coded as 2) tend to exhibit a higher CoE and slightly higher WACC compared to G7 firms. The region is also negatively and significantly correlated with the ESG composite and the individual pillars, indicating that firms in BRICS countries tend to have lower ESG performance scores.

Furthermore, Institutional quality exhibits significant negative correlations with the CoE ($r = –0.4141$) and WACC ($r = –0.0734$), with both p-values equal to 0.000. This suggests that stronger institutional environments are associated with lower financing costs. It is also positively correlated with ESG scores and firm size but negatively related to leverage, supporting the notion that firms in better institutional settings tend to be larger, less leveraged, and more sustainable.

Moreover, firm size has a substantial negative correlation with both the CoD and CoE, which is supported by their coefficient values and p-values. This suggests that larger firms enjoy lower financing costs, likely due to reduced risk and better creditworthiness. All ESG pillars and institutional quality have a positive correlation with the firm size, indicating that larger firms typically operate in more developed institutional environments and maintain better ESG performance.

Lastly, leverage is significantly correlated negatively with both the CoE ($r = –0.0872$ with p-value less than 0.01) and the CoD ($r = –0.1402$ with p-value less than 0.01). This seems contradictory, but it might mean that companies with lower financing costs deliberately take on more debt, or that companies with strong institutional environments and high ESG manage leverage differently. Then, leverage is also significantly negatively correlated with the social pillar and moderately with institutional quality.

4.4 Diagnostic Tests

4.4.1 Model Selection

This study uses panel data spanning seven years from ten different countries. To identify the most appropriate estimation method, three competing models were evaluated: Pooled Ordinary Least Squares (Pooled OLS), Fixed Effects (FE), and Random Effects (RE). A series of diagnostic tests was conducted to guide model selection.

Table 4.3 Model Selection Tests

	Breusch-Pagan LM Test	**Redundant Fixed Effects Test**	**Hausman Test**	**Results**
Variables	**p-value**	**p-value**	**p-value**	
IV: ESG Composite				
WACC	0.2117	0.1920	-	Pooled OLS
Cost of Debt	0.0000	0.0000	0.0001	FE
Cost of Equity	0.0000	0.0000	0.0031	FE
IV: Environment, Social & Governance				
WACC	0.3372	0.1972	-	Pooled OLS
Cost of Debt	0.0000	0.0000	0.0049	FE
Cost of Equity	0.0000	0.0000	0.0323	FE
IV: Environment				
WACC	0.1929	0.1796	-	Pooled OLS
Cost of Debt	0.0000	0.0000	0.0073	FE
Cost of Equity	0.0000	0.0000	0.0182	FE
IV: Social				
WACC	0.2087	0.1871	-	Pooled OLS

Cost of Debt	0.0000	0.0000	0.0003	FE
Cost of Equity	0.0000	0.0000	0.0040	FE
IV: Governance				
WACC	0.1964	0.1815	-	Pooled OLS
Cost of Debt	0.0000	0.0000	0.1467	RE
Cost of Equity	0.0000	0.0000	0.0152	FE
IV: ESG Composite **MV: Institutional Quality**				
WACC	0.3485	0.3024	-	Pooled OLS
Cost of Debt	0.0000	0.0000	0.0001	FE
Cost of Equity	0.0000	0.0000	0.0011	FE
IV: Environment, Social & Governance **MV: Institutional Quality**				
WACC	0.3741	0.3289	-	Pooled OLS
Cost of Debt	0.0000	0.0000	0.0060	FE
Cost of Equity	0.0000	0.0000	0.0087	FE

The Breusch–Pagan Lagrange Multiplier (LM) test was first performed to determine whether panel effects exist. The null hypothesis assumes that Pooled OLS is appropriate (no significant panel-level variance). If the p-value is less than 0.05, the null hypothesis will be rejected, and this means that Pooled OLS is inappropriate. The Fixed Effects (FE) or Random Effects (RE) should be considered. If the p-value is greater than 0.05, then Pooled OLS is suitable for the model. The Hausman test was then applied to determine whether the Fixed Effects or Random Effects estimator is more consistent. The null hypothesis states that Random Effects is consistent, where the alternative hypothesis proves that Fixed Effects is consistent. If the p-value is less than 0.05, the H0 is rejected and vice versa.

Based on the table, with WACC as the dependent variable in Model 1, the Breusch-Pagan LM test and Redundant Fixed Effects Test produced a p-value of 0.2117 and 0.1920 against FE and RE, indicating that Pooled OLS can be used for the variable WACC in Model 1. While the CoD and equity both show a p-value of 0.0000 in both FE and RE tests, 0.0001 and 0.00131 in the Hausman test, implying that FE is appropriate for the variables CoD and Coe. The same situation occurs for variable WACC in each model 1 to 3, where Pooled OLS is suitable.

In Model 2, where ESG pillars are tested together. Both the CoD and CoE have a p-value less than 0.05 in the Hausman Test, after producing p-values of 0.0000 in the Breusch-Pagan LM test and Redundant Fixed Effects Test. This indicates that both of them could be appropriate to use the FE model. Besides, when the variables are tested individually, they show similar results where FE is suitable to be used for the CoD and CoE after testing, particularly in the Environment and Social pillars. While the Governance pillar shows an inverse result in the CoD, where RE model is supported as its p-value is greater than 0.05. The CoE produced a p-value of 0.0152 in the Hausman Test, which implies that Fe is appropriate to be used.

In Model 3, with Institutional Quality as the moderator, the model also shows similar results. In the testing of ESG Composite and the Environment, Social, and Governance pillars, the CoD and CoE in the Breusch-Pagan LM test and Redundant Fixed Effects Test have p-values of 0.0000, then with both p-values are less than 0.05 as well in the Hausman test. This indicates that FE is appropriate for them.

4.4.2 Diagnostic Test for Model 1

4.4.2.1 Multicollinearity & Variance Inflation Factor (VIF) test

The table below presents the Variance Inflation Factor (VIF) results for all three dependent variables (WACC, CoD, and CoE), which are used to test for the presence of multicollinearity among them.

Table 4.4 Multicollinearity & VIF Test for Model 1

VIF	**Dependent Variable**		
	WACC	**Cost of Debt**	**Cost of Equity**
ESG Composite	16.70	16.68	16.70
ESG Composite*Region	15.81	15.79	15.81
Region	1.22	1.22	1.22
Firm Size	1.32	1.32	1.30
Leverage	1.02	1.02	1.02
Mean VIF	7.21	7.21	7.21

The results in the table above show notably high VIF values for the ESG Composite variable (16.70) and the interaction term between ESG Composite × Region (15.80). These results show a significant level of multicollinearity because they are higher than the usual cutoff criterion of 10. This is expected and theoretically justifiable because interaction terms are naturally correlated with their component variables. Importantly, this type of multicollinearity does not invalidate the results, as high VIF in interaction models is

common and generally acceptable when the interaction term is intentionally included to test moderating effects.

Besides, the results also indicate that control variables (Firm Size and Leverage) have low VIF values ranging between 1.02 and 1.32, well below the commonly accepted thresholds of 5 or 10. This suggests that these variables do not contribute to multicollinearity concerns and are statistically stable within the models. As the Region is a binary dummy variable coded as 1 = G7 and 2 = BRICS+, it shows consistently low values across all variables, indicating that multicollinearity involving the Region variable is minimal.

The mean VIF of 7.21 across all variables remains below the threshold of 10, indicating that the overall model does not suffer from severe multicollinearity. Therefore, the regression models continue to be statistically credible even though the ESG-related variables show higher VIF values because of the inherent nature of interaction terms.

4.4.2.2 Heteroscedasticity test

The results of the heteroscedasticity tests for the three dependent variables are shown in the table below, to determine whether one of the traditional OLS assumptions is violated by the variance of the error term being non-constant.

Table 4.5 Heteroscedasticity Test for Model 1

	Dependent Variable		
IV: ESG Composite	**WACC**	**Cost of Debt**	**Cost of Equity**
p-value	0.0000	0.0000	0.0000
Heteroscedasticity	Yes	Yes	Yes
Solution	Panel Correct Standard Error (PCSE)	Panel Correct Standard Error (PCSE)	Panel Correct Standard Error (PCSE)

Additionally, Model 1 exhibits heteroscedasticity problems for all three dependent variables, as indicated by the significant positive p-values of 0.0000 in the table above. This indicates that the null hypothesis of homoscedasticity is rejected, and the variance of the error term is not constant. Therefore, the Panel Correct Standard Error (PCSE) at the firm level is applied to correct this issue. This approach is appropriate for panel data, as it simultaneously addresses heteroscedasticity and within-firm serial correlation, ensuring that the coefficient estimates remain consistent and that the reported t-statistics and significance levels are reliable.

4.4.2.3 Autocorrelation test

The table below shows the results of the Wooldridge tests for all three dependent variables (WACC, CoD, and CoE), to test for the autocorrelation problem in the model.

Table 4.6 Autocorrelation Test for Model 1

IV: ESG Composite	**Dependent Variable**		
	WACC	**Cost of Debt**	**Cost of Equity**
p-value	0.4449	0.1390	0.0000
Autocorrelation	No	No	Serial Correlation
Solution	-	-	Panel Correct Standard Error (PCSE)

Based on the table, both WACC and the CoD show no evidence of autocorrelation in Model 1, as proven by the p-values greater than 0.05 (0.4449 and 0.1390). However, the CoE has strong evidence of an autocorrelation issue (p-value less than 0.05), indicating that it suffers from serial correlation. Thus, the Panel Correct Standard Error (PCSE) method, which was previously applied, is also the solution for this issue.

4.4.3 Diagnostic Test for Model 2

4.4.3.1 Multicollinearity & Variance Inflation Factor (VIF) test

Table 4.7 Multicollinearity & VIF Test for Model 2

VIF	Dependent Variable		
	WACC	**Cost of Debt**	**Cost of Equity**
Environment	33.60	33.60	33.60
Environment*Region	30.28	30.28	30.28
Social	36.89	36.89	36.89
Social*Region	33.97	33.97	33.97
Governance	18.16	18.16	18.16
Governance*Region	17.96	17.96	17.96
Region	1.23	1.23	1.23
Firm Size	1.31	1.31	1.31
Leverage	1.04	1.04	1.04
Mean VIF	19.38	19.38	19.38

Based on the table above, the Environment, Social, and Governance pillars show VIF values of 33.60, 36.89, and 18.16, respectively, all of which exceed the conventional VIF threshold of 10. Similarly, their respective interaction terms also present high VIF values. These elevated values indicate strong multicollinearity between each ESG pillar and its interaction term, which is expected because interaction terms are naturally correlated with their component variables.

Besides, the results also indicate that control variables (Firm Size and Leverage), have low VIF values ranging between 1.04 and 1.31, well below the commonly accepted thresholds of 5 or 10. This suggests that these variables do not contribute to multicollinearity concerns and are statistically stable within the models. As the Region is a binary dummy variable coded as 1 = G7 and 2 = BRICS+, it shows consistently low values across all variables, indicating that multicollinearity involving the Region variable is minimal.

The mean VIF value of 19.38 is higher than commonly recommended thresholds. However, the main reason for the inflated mean VIF is the structurally high collinearity of all three ESG pillars and their interaction terms. In moderated regression with multiple interactions, such VIF levels are typical and not necessarily problematic as long as the coefficients remain interpretable and the standard errors are not excessively inflated.

Table 4.8 Multicollinearity & VIF Test for Model 2

VIF	**Dependent Variable**		
	WACC	**Cost of Debt**	**Cost of Equity**
Environment	12.83	12.83	12.83
Environment*Region	12.44	12.44	12.44
Region	1.29	1.29	1.29
Firm Size	1.18	1.18	1.18
Leverage	1.03	1.03	1.03
Mean VIF	5.76	5.76	5.76

While testing the individual pillar, it shows high values for the Environment pillar and its interaction term with the cost of capital variables. This is expected and theoretically justifiable because interaction terms are naturally correlated with their component variables. Importantly, this type of multicollinearity does not invalidate the results, as high VIF in interaction models is common and generally acceptable when the interaction term is intentionally included to test moderating effects.

Besides, the results also indicate that control variables (Firm Size and Leverage) have low VIF values ranging between 1.03 and 1.18; these

values are acceptable as they are lower than 5 or 10. This suggests that these variables do not contribute to multicollinearity concerns and are statistically stable within the models. As the Region is a binary dummy variable coded as 1 = G7 and 2 = BRICS+, it shows consistently low values across all variables, indicating that multicollinearity involving the Region variable is minimal.

The mean VIF of 5.76 across all variables remains below the threshold of 10, indicating that the overall model does not suffer from severe multicollinearity. Therefore, the regression models continue to be statistically credible even though the ESG-related variables show higher VIF values because of the inherent nature of interaction terms.

Table 4.9 Multicollinearity & VIF Test for Model 2

VIF	**Dependent Variable**		
	WACC	**Cost of Debt**	**Cost of Equity**
Social	13.71	13.71	13.71
Social*Region	13.24	13.24	13.24
Region	1.27	1.27	1.27
Firm Size	1.19	1.19	1.19
Leverage	1.03	1.03	1.03
Mean VIF	6.09	6.09	6.09

While testing the individual pillar, it shows high values for the Social pillar and its interaction term with the cost of capital variables. This is expected and theoretically justifiable because interaction terms are naturally correlated with their component variables. Importantly, this type of multicollinearity does not invalidate the results, as high VIF in

interaction models is common and generally acceptable when the interaction term is intentionally included to test moderating effects.

Besides, the results also indicate that control variables (Firm Size and Leverage) have low VIF values ranging between 1.03 and 1.19; these values are acceptable as they are lower than 5 or 10. This suggests that these variables do not contribute to multicollinearity concerns and are statistically stable within the models. As the Region is a binary dummy variable coded as 1 = G7 and 2 = BRICS+, it shows consistently low values across all variables, indicating that multicollinearity involving the Region variable is minimal.

The mean VIF of 6.09 across all variables remains below the threshold of 10, indicating that the overall model does not suffer from severe multicollinearity. Therefore, the regression models continue to be statistically credible even though the ESG-related variables show higher VIF values because of the inherent nature of interaction terms.

Table 4.10 Multicollinearity & VIF Test for Model 2

VIF	**Dependent Variable**		
	WACC	**Cost of Debt**	**Cost of Equity**
Governance	14.54	14.54	14.54
Governance*Region	14.09	14.09	14.09
Region	1.22	1.22	1.22
Firm Size	1.22	1.22	1.22
Leverage	1.02	1.02	1.02
Mean VIF	6.42	6.42	6.42

While testing the individual pillar, it shows high values for the Governance pillar and its interaction term with the cost of capital

variables. This is expected and theoretically justifiable because interaction terms are naturally correlated with their component variables. Importantly, this type of multicollinearity does not invalidate the results, as high VIF in interaction models is common and generally acceptable when the interaction term is intentionally included to test moderating effects.

Besides, the results also indicate that control variables (Firm Size and Leverage) have low VIF values ranging between 1.02 and 1.22; these values are acceptable as they are lower than 5 or 10. This suggests that these variables do not contribute to multicollinearity concerns and are statistically stable within the models. As the Region is a binary dummy variable coded as 1 = G7 and 2 = BRICS+, it shows consistently low values across all variables, indicating that multicollinearity involving the Region variable is minimal.

The mean VIF of 6.42 across all variables remains below the threshold of 10, indicating that the overall model does not suffer from severe multicollinearity. Therefore, the regression models continue to be statistically credible even though the ESG-related variables show higher VIF values because of the inherent nature of interaction terms.

4.4.3.2 Heteroscedasticity test

Table 4.11 Heteroscedasticity Test for Model 2

	Dependent Variable		
IV: Environment, Social & Governance	**WACC**	**Cost of Debt**	**Cost of Equity**
p-value	0.0000	0.0000	0.0000
Heteroscedasticity	Yes	Yes	Yes

Solution	Panel Correct Standard Error (PCSE)	Panel Correct Standard Error (PCSE)	Panel Correct Standard Error (PCSE)
IV: Environment	**WACC**	**Cost of Debt**	**Cost of Equity**
p-value	0.0000	0.0000	0.0000
Heteroscedasticity	Yes	Yes	Yes
Solution	Panel Correct Standard Error (PCSE)	Panel Correct Standard Error (PCSE)	Panel Correct Standard Error (PCSE)
IV: Social	**WACC**	**Cost of Debt**	**Cost of Equity**
p-value	0.0000	0.0000	0.0000
Heteroscedasticity	Yes	Yes	Yes
Solution	Panel Correct Standard Error (PCSE)	Panel Correct Standard Error (PCSE)	Panel Correct Standard Error (PCSE)
IV: Governance	**WACC**	**Cost of Debt**	**Cost of Equity**
p-value	0.0000	0.0000	0.0000
Heteroscedasticity	Yes	Yes	Yes
Solution	Panel Correct Standard Error (PCSE)	Panel Correct Standard Error (PCSE)	Panel Correct Standard Error (PCSE)

Besides, Model 2, which includes the individual E, S, and G pillars, exhibits heteroscedasticity problems for all three dependent variables, as indicated by the significant positive p-values of 0.0000 in the table above. This indicates that the null hypothesis of homoscedasticity is rejected, and the variance of the error term is not constant. Therefore, the Panel Correct Standard Error (PCSE) at the firm level is applied to correct this issue. This approach is appropriate for panel data, as it simultaneously addresses heteroscedasticity and within-firm serial correlation, ensuring that the coefficient estimates remain consistent and that the reported t-statistics and significance levels are reliable.

4.4.3.3 Autocorrelation test

Table 4.12 Autocorrelation Test for Model 2

	Dependent Variable		
IV: Environment, Social & Governance	**WACC**	**Cost of Debt**	**Cost of Equity**
p-value	0.4855	0.1336	0.0000
Autocorrelation	No	No	Serial Correlation
Solution	-	-	Panel Correct Standard Error (PCSE)
IV: Environment	**WACC**	**Cost of Debt**	**Cost of Equity**
p-value	0.5108	0.1391	0.0000
Autocorrelation	No	No	Serial Correlation
Solution	-	-	Panel Correct Standard Error (PCSE)
IV: Social	**WACC**	**Cost of Debt**	**Cost of Equity**
p-value	0.4149	0.1379	0.0000
Autocorrelation	No	No	Serial Correlation
Solution	-	-	Panel Correct Standard Error (PCSE)
IV: Governance	**WACC**	**Cost of Debt**	**Cost of Equity**
p-value	0.4664	0.1351	0.0000
Autocorrelation	No	No	Serial Correlation
Solution	-	-	Panel Correct Standard Error (PCSE)

Based on the tables, both WACC and the CoD show no evidence of autocorrelation in all variables in Model 2, as proven by the p-values greater than 0.05. However, the CoE for all variables has strong evidence of an autocorrelation issue (p-value less than 0.05), indicating that it suffers from serial correlation. Thus, the Panel Correct Standard Error (PCSE) method, which was previously applied, is also the solution for this issue.

4.4.4 Diagnostic Test for Model 3

4.4.4.1 Multicollinearity & Variance Inflation Factor (VIF) test

Table 4.13 Multicollinearity & VIF Test for Model 3

VIF	Dependent Variable		
	WACC	**Cost of Debt**	**Cost of Equity**
ESG Composite	1.46	1.46	1.46
ESG Composite*IQ	1.20	1.20	1.20
Institutional Quality	1.12	1.12	1.12
Firm Size	1.24	1.24	1.24
Leverage	1.02	1.02	1.02
Mean VIF	1.21	1.21	1.21

Table 4.14 Multicollinearity & VIF Test for Model 3

VIF	Dependent Variable		
	WACC	**Cost of Debt**	**Cost of Equity**
Environment	2.69	2.69	2.69
Environment*IQ	2.92	2.92	2.92
Social	2.93	2.93	2.93
Social*IQ	3.18	3.18	3.18
Governance	1.50	1.50	1.50
Governance*IQ	1.58	1.58	1.58
Institutional Quality	1.14	1.14	1.14
Firm Size	1.23	1.23	1.23
Leverage	1.04	1.04	1.04
Mean VIF	2.02	2.02	2.02

For Model 3, in which Institutional Quality is the moderator, the testing of ESG Composite, Environment, Social, and Governance pillars all show acceptable VIF values that are less than 5, respectively, for all the cost of capital variables. Similarly, their respective interaction terms also present low VIF values. This indicates that there is a weak presence of multicollinearity between each ESG pillar and its interaction term.

Besides, the results also indicate that control variables (Firm Size and Leverage) have low VIF values ranging between 1.02 and 1.24, well below the commonly accepted thresholds of 5. This suggests that these variables do not contribute to multicollinearity concerns and are statistically stable within the models. As the Region is a binary dummy variable coded as 1 = G7 and 2 = BRICS+, it shows consistently low values across all variables, indicating that multicollinearity involving the Region variable is minimal.

The mean VIF values of 1.21 and 2.02 are considered low, which indicates very low levels of multicollinearity in the model. This

suggests that the variables are not strongly correlated with one another, and therefore each variable can be interpreted reliably without concern that shared variance is distorting coefficient estimates.

4.4.4.2 Heteroscedasticity test

Table 4.15 Heteroscedasticity Test for Model 3

	Dependent Variable		
IV: ESG Composite MV: Institutional Quality	**WACC**	**Cost of Debt**	**Cost of Equity**
p-value	0.0000	0.0000	0.0000
Heteroscedasticity	Yes	Yes	Yes
Solution	Panel Correct Standard Error (PCSE)	Panel Correct Standard Error (PCSE)	Panel Correct Standard Error (PCSE)
IV: Environment, Social & Governance MV: Institutional Quality	**WACC**	**Cost of Debt**	**Cost of Equity**
p-value	0.0000	0.0000	0.0000
Heteroscedasticity	Yes	Yes	Yes
Solution	Panel Correct Standard Error (PCSE)	Panel Correct Standard Error (PCSE)	Panel Correct Standard Error (PCSE)

Besides, the moderator that is included in Model 3 also exhibits heteroscedasticity problems between the variables, as indicated by the significant positive p-values of 0.0000 in the table above. This indicates that the null hypothesis of homoscedasticity is rejected, and the variance of the error term is not constant. Therefore, the Panel Correct Standard Error (PCSE) at the firm level is applied to correct this issue. This approach is appropriate for panel data, as it simultaneously addresses heteroscedasticity

and within-firm serial correlation, ensuring that the coefficient estimates remain consistent and that the reported t-statistics and significance levels are reliable.

4.4.4.3 Autocorrelation test

Table 4.16 Autocorrelation Test for Model 3

IV: ESG Composite **MV: Institutional Quality**	**Dependent Variable**		
	WACC	**Cost of Debt**	**Cost of Equity**
p-value	0.3097	0.1381	0.0000
Autocorrelation	No	No	Serial Correlation
Solution	-	-	Panel Correct Standard Error (PCSE)
IV: Environment, Social & Governance **MV: Institutional Quality**			
	WACC	**Cost of Debt**	**Cost of Equity**
p-value	0.3819	0.1325	0.0000
Autocorrelation	No	No	Serial Correlation
Solution	-	-	Panel Correct Standard Error (PCSE)

Although Institutional Quality was included in earlier model specifications, Model 5 contains additional interaction terms that alter the structure of the residuals. Therefore, the Wooldridge autocorrelation test was performed again to ensure that serial correlation did not bias the standard errors in this model. The results are the same as previous models; both WACC and the CoD show the same result as the previous: no evidence of autocorrelation, as the p-values are all greater than 0.05. However, the CoE has strong evidence of an autocorrelation issue, with a significant positive p-value of 0.0000. This proves that it suffers from serial correlation. Thus, the Panel Correct Standard Error (PCSE) method, which was previously applied, is also the solution for this issue.

4.5 Model Results

4.5.1 Regression Results for RQ1

Table 4.17 Regression Results for RQ1

	Dependent Variable		
Statistics	**WACC**	**Cost of Debt**	**Cost of Equity**
Adjusted R-squared	0.0071	0.0313	0.1773
F-statistics	139.84	43.14	267.23
(p-value)	0.000	0.000	0.000
ESG Composite			
Coefficient	-0.1571	-0.1484	-0.0886***
t-statistics	-1.59	-1.09	-6.70
(p-value)	0.111	0.276	0.000
Region			
Coefficient	0.0354*	0.0091	0.0210***
t-statistics	1.90	0.75	5.36
(p-value)	0.057	0.456	0.000
ESG*Region			
Coefficient	0.1058*	0.0995	0.0620***
t-statistics	1.69	1.33	6.23
(p-value)	0.092	0.183	0.000
Firm Size			
Coefficient	0.0053	-0.0081***	-0.0037***
t-statistics	0.61	-4.12	-6.91
(p-value)	0.542	0.000	0.000
Leverage			
Coefficient	-0.0479***	-0.1147***	-0.0178***
t-statistics	-3.49	-5.16	-6.63
(p-value)	0.000	0.000	0.000
Constant			
Coefficient	-0.0439	0.1648***	0.0829***
t-statistics	-0.35	4.26	9.89
(p-value)	0.726	0.006	0.000

The regression results for Research Question 1 examine the effect of ESG Composite scores on firms' cost of capital, showing that ESG performance plays a differentiated role across financing measures. The models explain very

little variation in WACC (0.71%) and CoD (3.13%), but a much larger percentage for the CoE (17.73%), according to the adjusted R-squared values. This pattern suggests that, in comparison to debt or total capital structure, ESG performance and the integrated controls have more explanatory value for equity financing decisions. Nonetheless, the F-statistics for the three variables are highly significant (p less than 0.001), indicating that each model is jointly relevant and that the independent variables together enhance the dependent variable's prediction when compared to a null model.

Besides, the ESG Composite score is negatively associated with all three cost-of-capital measures, but the effect is statistically significant only for the CoE, as shown by $\beta = -0.0886$, p-value less than 0.001. While the Region dummy is positive and significant for CoE ($\beta = 0.0210$, $p < 0.001$), indicating that BRICS firms face higher equity financing costs than G7 firms.

Furthermore, the interaction term between ESG Composite and Region is positive and significant for the CoE, as shown by $\beta = 0.0620$, p-value less than 0.01. The positive interaction term for CoE implies that in G7 countries, good ESG scores lower the equity cost more than they do in BRICS+ countries. For WACC and CoD, their ESG and interaction impacts are not statistically significant, but they are directionally negative, indicating that ESG has a limited impact on debt price in this situation.

Additionally, the control variables behave consistently with expectations: leverage significantly reduces all cost-of-capital measures, while firm size significantly lowers CoD and CoE, as reflected by the significant p-values less than 0.01.

4.5.2 Regression Results for RQ2

Table 4.18 Regression Results for RQ2

	Dependent Variable		
Statistics	**WACC**	**Cost of Debt**	**Cost of Equity**
Adjusted R-squared	0.0082	0.0349	0.1808
F-statistics	204.60	52.69	340.55
(p-value)	0.0000	0.0000	0.0000
Environment			
Coefficient	-0.0092	0.0054	-0.0282***
t-statistics	-0.54	0.09	-3.68
(p-value)	0.591	0.928	0.000
Social			
Coefficient	-0.0846	-0.143	-0.0183*
t-statistics	-1.15	-0.90	-1.71
(p-value)	0.252	0.368	0.087
Governance			
Coefficient	-0.0443	0.0381	-0.227*
t-statistics	-0.91	0.85	-1.75
(p-value)	0.364	0.394	0.081
Region			
Coefficient	0.0375*	0.0088	0.0218***
t-statistics	1.92	0.79	5.69
(p-value)	0.055	0.429	0.000
E*Region			
Coefficient	-0.0066	-0.0108	0.0180***
t-statistics	-0.33	-0.33	3.79
(p-value)	0.738	0.745	0.000
S*Region			
Coefficient	00625	0.1220	0.0102
t-statistics	1.05	1.45	1.48
(p-value)	0.296	0.146	0.139
G*Region			
Coefficient	0.0502	-0.0400	0.0246***
t-statistics	1.42	-1.50	2.95
(p-value)	0.157	0.134	0.003
Firm Size			
Coefficient	0.0057	-0.0081***	-0.0037***
t-statistics	0.64	-3.82	-7.25
(p-value)	0.523	0.000	0.000
Leverage			
Coefficient	-0.0512***	-0.1161***	-0.0184***
t-statistics	-3.78	-5.22	-6.49
(p-value)	0.000	0.000	0.000
Constant			
Coefficient	-0.0507	0.1654***	0.0812***
t-statistics	-0.39	4.13	10.01
(p-value)	0.693	0.000	0.000

The regression results for Research Question 2 examine individual ESG pillars and reveal that the influence of Environmental, Social, and

Governance performance varies substantially across different components of the cost of capital. The models explain very little variation in WACC (0.82%) and CoD (3.49%), but a much larger percentage for the CoE (18.08%), according to the adjusted R-squared values. Nevertheless, the F-statistics are highly significant ($p < 0.001$) across all regressions, confirming that the models are statistically valid and that the included predictors jointly explain the dependent variables better than a null model.

None of the pillar variables show statistically significant associations with the WACC and CoD, indicating that lenders and overall capital providers do not appear to price firm-level ESG pillar performance into debt financing or total capital structure. The results for the CoE, on the other hand, show significant trends: all three pillars show negative coefficients, indicating that better governance, social, and environmental performance is linked to lower equity financing costs. Among these, the Environmental pillar ($\beta = –0.0282$, p-value less than 0.001) shows a strong, statistically significant effect. The Social pillar ($\beta = –0.0183$, p-value = 0.087) exhibits a marginally significant negative effect. The Governance pillar ($\beta = –0.0227$, p-value = 0.081) also shows a weakly significant negative relationship.

Besides, the Region dummy variable is significant only for the CoE ($\beta = 0.0218$, p-value less than 0.001), suggesting that BRICS firms consistently face higher equity financing costs. The interaction terms provide additional insights into regional differences. For the CoE, the interaction term between Environment and Governance with Region is both positive and significant, as presented by their low p-values. The positive interaction term for CoE implies that in G7 countries, good Environment and Governance scores lower the equity cost more than they do in BRICS+ countries. The lack of significance of the Social with Region interaction indicates that there are few regional variations in how social practices are valued.

Additionally, the control variables behave consistently with expectations: leverage significantly reduces all cost-of-capital measures, while firm size significantly lowers CoD and CoE, as reflected by the significant p-values less than 0.01.

Table 4.19 Regression Results for RQ2

	Dependent Variable		
Statistics	**WACC**	**Cost of Debt**	**Cost of Equity**
Adjusted R-squared	0.0063	0.0297	0.1683
F-statistics	168.24	40.78	269.05
(p-value)	0.0000	0.0000	0.0000
Environment			
Coefficient	-0.0665*	-0.0575	-0.0447***
t-statistics	-1.79	-1.12	-5.51
(p-value)	0.074	0.263	0.000
Region			
Coefficient	0.0348*	0.0091	0.0207***
t-statistics	1.88	0.82	5.48
(p-value)	0.060	0.414	0.000
E*Region			
Coefficient	0.0404*	0.0399	0.0306***
t-statistics	1.89	1.29	5.16
(p-value)	0.058	0.198	0.000
Firm Size			
Coefficient	0.0055	-0.0083***	-0.0037***
t-statistics	0.64	-3.80	-6.86
(p-value)	0.524	0.000	0.000
Leverage			
Coefficient	-0.0480***	-0.1138***	-0.0175***
t-statistics	-3.52	-5.16	-6.56
(p-value)	0.000	0.000	0.000
Constant			
Coefficient	-0.0475	0.1661***	0.0825***
t-statistics	-0.38	4.11	10.07
(p-value)	0.708	0.000	0.000

Next, it is the individual Environmental pillar. The models explain very little variation in WACC (0.63%) and CoD (2.97%), but a much larger percentage for the CoE (16.83%), according to the adjusted R-squared values. Nevertheless, the F-statistics are highly significant, with p-values of 0.000 across all regressions, confirming that the models are statistically valid and that the included predictors jointly explain the dependent variables better than a null model.

The Environment pillar shows no statistically significant relationship to the CoD, but it has a weak negative relationship to the WACC (β = -0.0665*, p

= 0.074), and a significant negative relationship to the CoE (β = -0.0447, p = 0.000).

Besides, the Region dummy variable is significant for the WACC and the CoE, as reflected by their significant p-values. The interaction terms provide additional insights into regional differences. The interaction between WACC with the Environment pillar is positive and significant. While for the CoE, the interaction term between the Environment pillar with the Region is strongly positive and significant, as presented by a low p-value (0.000). The positive interaction term for CoE implies that in G7 countries, good Environment scores lower the equity cost more than they do in BRICS+ countries.

Additionally, the control variables behave consistently with expectations: leverage significantly reduces all cost-of-capital measures, while firm size significantly lowers CoD and CoE, as shown by the significant p-values less than 0.01.

Table 4.20 Regression Results for RQ2

	Dependent Variable		
Statistics	**WACC**	**Cost of Debt**	**Cost of Equity**
Adjusted R-squared	0.0070	0.0331	0.1681
F-statistics	135.11	41.92	265.92
(p-value)	0.0000	0.0000	0.0000
Social			
Coefficient	-0.1216	-0.1192	-0.0611***
t-statistics	-1.58	-1.09	-6.31
(p-value)	0.115	0.274	0.000
Region			
Coefficient	0.0359*	0.0103	0.0209***
t-statistics	1.84	0.88	5.50
(p-value)	0.065	0.380	0.000
S*Region			
Coefficient	0.0852	0.0919	0.0419***
t-statistics	1.54	1.49	5.50
(p-value)	0.123	0.135	0.000
Firm Size			
Coefficient	0.0053	-0.0085***	-0.0035***
t-statistics	0.63	-3.83	-6.37
(p-value)	0.530	0.000	0.000

Leverage			
Coefficient	-0.0488***	-0.1153***	-0.0185***
t-statistics	-3.61	-5.15	-6.96
(p-value)	0.000	0.000	0.000
Constant			
Coefficient	-0.0450	0.1679***	0.0806***
t-statistics	-0.36	4.11	9.39
(p-value)	0.716	0.000	0.000

The table above shows the individual Social pillar with the cost of capital measures. The models explain very little variation in WACC (0.7%) and CoD (3.31%), but a much larger percentage for the CoE (16.81%), according to the adjusted R-squared values. Nevertheless, the F-statistics are highly significant, with p-values of 0.000 across all regressions, confirming that the models are statistically valid and that the included predictors jointly explain the dependent variables better than a null model.

The Social pillar shows no statistically significant relationship to the WACC and CoD, as their p-values are not significant. However, it shows a significant negative relationship to the CoE ($\beta = -0.0611$, $p = 0.000$).

Furthermore, the Region dummy variable is significant for the WACC and the CoE, as reflected by their significant p-values. The interaction terms provide additional insights into regional differences. For the CoE, the interaction term between the Social pillar with Region is strongly positive and significant, as presented by the significant p-value of 0.000. The positive interaction term for CoE implies that in G7 countries, good Social scores lower the equity cost more than they do in BRICS+ countries.

Additionally, the control variables behave consistently with expectations: leverage significantly reduces all cost-of-capital measures, while firm size significantly lowers CoD and CoE, as shown by the significant p-values less than 0.01.

Table 4.21 Regression Results for RQ2

	Dependent Variable		
Statistics	**WACC**	**Cost of Debt**	**Cost of Equity**
Adjusted R-squared	0.0076	0.0285	0.1746
F-statistics	106.92	46.03	351.03
(p-value)	0.0000	0.0000	0.0000
Governance			
Coefficient	-0.0886	-0.0283	-0.0467***
t-statistics	-1.25	-0.73	-3.81
(p-value)	0.212	0.463	0.000
Region			
Coefficient	0.0378*	0.0082	0.0218***
t-statistics	1.94	0.80	5.79
(p-value)	0.053	0.425	0.000
G*Region			
Coefficient	0.0766	0.0128	0.0390***
t-statistics	1.54	0.50	4.70
(p-value)	0.124	0.618	0.000
Firm Size			
Coefficient	0.0049	-0.0079***	-0.0037***
t-statistics	0.58	-3.14	-7.50
(p-value)	0.564	0.002	0.000
Leverage			
Coefficient	-0.0471***	-0.1136***	-0.0176***
t-statistics	-3.32	-5.01	-6.53
(p-value)	0.001	0.000	0.000
Constant			
Coefficient	-0.0436***	0.1613***	0.0815***
t-statistics	-0.35	3.75	10.11
(p-value)	0.727	0.000	0.000

The table above shows the individual Governance pillar with the cost of capital measures. The models explain very little variation in WACC (0.7%) and CoD (3.31%), but a much larger percentage for the CoE (16.81%), according to the adjusted R-squared values. Nevertheless, the F-statistics are highly significant, with p-values of 0.000 across all regressions, confirming that the models are statistically valid and that the included predictors jointly explain the dependent variables better than a null model.

The Governance pillar shows no statistically significant relationship to the WACC and CoD, as their p-values are not significant. However, it shows a significant negative relationship to the CoE (β = -0.0611, p = 0.000).

Furthermore, the Region dummy variable is significant for the WACC and the CoE, as reflected by their significant p-values. The interaction terms provide additional insights into regional differences. For the CoE, the interaction term between the Governance pillar with Region is strongly positive and significant, as presented by the significant p-value of 0.000. The positive interaction term for CoE implies that in G7 countries, good Governance scores lower equity costs more than they do in BRICS+ countries.

Additionally, the control variables behave consistently with expectations: leverage significantly reduces all cost-of-capital measures, while firm size significantly lowers CoD and CoE, as shown by the significant p-values less than 0.01.

4.5.3 Regression Results for RQ3

Table 4.22 Regression Results for RQ3

	Dependent Variable		
Statistics	**WACC**	**Cost of Debt**	**Cost of Equity**
Adjusted R-squared	0.0080	0.0305	0.2308
F-statistics	128.11	41.43	250.30
(p-value)	0.0000	0.0000	0.0000
ESG Composite			
Coefficient	0.0075	0.0360	0.0122*
t-statistics	0.96	0.11	1.74
(p-value)	0.336	0.915	0.082
Institutional Quality			
Coefficient	-0.0009**	-0.0002	-0.0007***
t-statistics	-2.04	-0.71	-6.96
(p-value)	0.041	0.477	0.000
IQ*ESG			
Coefficient	-0.0023	-0.0019	-0.0012***
t-statistics	-1.53	-1.09	-5.60
(p-value)	0.126	0.275	0.000
Firm Size			
Coefficient	0.0034	-0.0088***	-0.0046***
t-statistics	0.45	-5.05	-7.20
(p-value)	0.654	0.000	0.000
Leverage			
Coefficient	-0.0444***	-0.1136***	-0.0161***
t-statistics	-3.05	-5.24	-5.85
(p-value)	0.002	0.000	0.000
Constant			
Coefficient	0.0297	0.1860***	0.1242***
t-statistics	0.34	6.94	17.45
(p-value)	0.730	0.000	0.000

The regression models incorporating Institutional Quality (IQ) as a moderator reveal meaningful insights into how governance environments shape the ESG–cost of capital relationship. Although the Adjusted R-squared values are modest for WACC (0.80%), CoD (3.05%), and a comparatively stronger for the CoE (23.08%), this suggests that a significant percentage of the variation in equity costs can be explained by ESG, institutional quality, and the control variables, but only a tiny portion of the variation in WACC and loan costs. Nonetheless, all three models

demonstrate highly significant F-statistics (p-value = 0.000), confirming that the predictors collectively improve model fit compared to an intercept-only model.

In terms of coefficient results, the ESG Composite score does not significantly influence WACC or the CoD, but it shows a marginally positive effect on the CoE (β = 0.0122, p-value = 0.082), implying that higher ESG performance may slightly increase equity costs when institutional quality is considered. Meanwhile, the Institutional Quality itself has a significant negative effect on both WACC (β = –0.0009, p-value of 0.041) and stronger on the CoE (β = –0.0007, p-value = 0.000), indicating that firms in stronger institutional environments benefit from lower capital costs, particularly lower equity financing costs. Importantly, the interaction term between IQ and ESG Composite is significant and negative only for the CoE(β = –0.0012, p-value = 0.000), suggesting that institutional quality strengthens the cost-reducing effect of ESG performance on equity financing. Control variables behave consistently with expectations: firm size lowers both CoD and CoE, and leverage significantly reduces all three cost-of-capital measures.

Table 4.23 Regression Results for RQ3

	Dependent Variable		
Statistics	**WACC**	**Cost of Debt**	**Cost of Equity**
Adjusted R-squared	0.0096	0.0341	0.2382
F-statistics	235.11	51.46	336.45
(p-value)	0.0000	0.0000	0.0000
Environment			
Coefficient	-0.0163	-0.0393	0.0008
t-statistics	-1.30	-0.54	0.44
(p-value)	0.193	0.590	0.660
Social			
Coefficient	0.0070	0.0389	-0.0032
t-statistics	0.46	0.92	-0.79
(p-value)	0.643	0.358	0.431
Governance			
Coefficient	0.0333***	-0.0216	0.0176***
t-statistics	4.00	-1.46	4.18
(p-value)	0.000	0.143	0.000
Institutional Quality			
Coefficient	-0.0010**	-0.0002	-0.0007***
t-statistics	-2.03	-0.79	-7.23

(p-value)	0.043	0.430	0.000
IQ*E			
Coefficient	0.0007	0.0006	-0.0001**
t-statistics	0.82	0.64	-1.29
(p-value)	0.413	0.521	0.198
IQ*S			
Coefficient	-0.0018	-0.0028	-0.0003*
t-statistics	-1.01	-1.31	-1.88
(p-value)	0.312	0.192	0.061
IQ*G			
Coefficient	-0.0015	0.0008	-0.0007***
t-statistics	-1.54	1.10	-5.15
(p-value)	0.123	0.272	0.000
Firm Size			
Coefficient	0.0039	-0.0087***	-0.0045***
t-statistics	0.50	-4.74	-7.46
(p-value)	0.619	0.000	0.000
Leverage			
Coefficient	-0.0498***	-0.1164***	-0.0172***
t-statistics	-3.57	-5.29	-6.03
(p-value)	0.000	0.000	0.000
Constant			
Coefficient	0.0254	0.1846***	0.1227***
t-statistics	0.29	6.60	18.99
(p-value)	0.773	0.000	0.000

The regression results examining the individual ESG pillars show mixed effects on the three cost of capital measures, with Institutional Quality as the moderator. The models explain very little variation in WACC (0.96%) and CoD (3.41%), but a much larger percentage for the CoE (23.82%), according to the adjusted R-squared values. Nevertheless, the F-statistics are highly significant, with p-values of 0.000 across all regressions, confirming that the models are statistically valid and that the included predictors jointly explain the dependent variables better than a null model.

For the Environment and Social pillar, none of them show a significant relationship to the cost of capital measures, as reflected by the insignificant p-values. In contrast, the Governance pillar shows statistically significant but positive results towards WACC and CoE, with significant p-values of 0.000. It also shows no significance to the CoD. Meanwhile, the Institutional Quality itself has a significant negative effect on both WACC ($\beta = -0.0010$, p-value of 0.043) and stronger on the CoE ($\beta = -0.0007$, p-value = 0.000),

indicating that firms in stronger institutional environments benefit from lower capital costs, particularly lower equity financing costs.

In addition, the interaction between institutional quality and the Environment pillar is insignificant across all models. Similarly, when it interacts with the Social pillar, it is insignificant as well for WACC and CoD, but it approaches significance (p-value of 0.061) for CoE with a negative direction. The weak significance could indicate that, in countries with stronger institutions, the social pillar may slightly reduce equity financing costs. Importantly, the interaction between institutional quality and governance is highly significant and negative for the CoE, with $\beta = -0.0007$, p-values less than 0.01. This indicates that good governance is especially effective at reducing equity costs in countries with stronger institutional environments. Moreover, firm size lowers loan and equity costs, while leverage dramatically lowers all of the dependent variables. These control variables exhibit consistent behaviour with expectations.

4.6 Hypotheses Testing Results

4.6.1 Hypothesis 1

4.6.1.1 Hypothesis 1a

H1a: The negative effect of ESG performance on the WACC differs significantly between firms in G7 countries and firms in BRICS+ countries.

The interaction between ESG and Region towards the WACC is weakly statistically significant (β = 0.1058, p-value = 0.092). This aligns with the academic literature regarding the comprehensive ESG score presents mixed results regarding its impact on financing costs (Kevser et al., 2024). This might lead to a weak relationship between them. Therefore, hypothesis H1a is supported, indicating that the effect of ESG on WACC does significantly differ between G7 and BRICS+ firms.

4.6.1.2 Hypothesis 1b

H1b: The negative effect of ESG performance on the CoD differs significantly between firms in G7 countries and firms in BRICS+ countries.

The interaction term of ESG and Region towards the CoD was not statistically significant (β = 0.0995, p-value = 0.183). This is consistent with study by Kevser et al., which claims that other results are insufficiently reliable to conclude that ESG performance positively affects the CoD (Kevser et al., 2024). Therefore, hypothesis H1b is not supported, indicating that the effect of ESG

on the CoD does not differ significantly between G7 and BRICS+ firms.

4.6.1.3 Hypothesis 1c

H1c: The negative effect of ESG performance on the CoE differs significantly between firms in G7 countries and firms in BRICS+ countries.

The interaction between ESG and Region towards the CoE was statistically significant ($\beta = 0.062$, p-value = 0.000). The research by Owolabi et al shows that ESG practices reduce risk, leading to lower equity risk premiums for investors (Owolabi et al., 2024). Thus, hypothesis H1c is supported, indicating that the effect of ESG on the CoE significantly differs between G7 and BRICS+ firms.

4.6.2 Hypothesis 2

4.6.2.1 Hypothesis 2a

H2a: The negative effect of the E, S, and G pillars on the WACC differs significantly between firms in G7 countries and firms in BRICS+ countries.

The interaction between the Environment, Social, and Governance pillars with the Region towards the WACC was not statistically significant, as shown by the insignificant p-values. The results are similar to scholarly research that has yielded conflicting results regarding the comprehensive ESG score's impact on financing costs (Kevser et al., 2024). Therefore, hypothesis H2a is not supported,

indicating that the effect of E, S, and G pillars on WACC does not significantly differ between G7 and BRICS+ firms.

4.6.2.2 Hypothesis 2b

H2b: The negative effect of the E, S, and G pillars on the cost of debt differs significantly between firms in G7 countries and firms in BRICS+ countries.

The interaction between the Environment, Social, and Governance pillars and the Region towards the CoD was not statistically significant, as shown by the insignificant p-values. This is consistent with study by Kevser et al., which claims that other results are insufficiently reliable to conclude that ESG performance positively affects the CoD (Kevser et al., 2024). Therefore, hypothesis H2b is not supported, indicating that the effect of Environment, Social, and Governance pillars on the CoD does not differ significantly between G7 and BRICS+ firms.

4.6.2.3 Hypothesis 2c

H2c: The negative effect of the E, S, and G pillars on the CoE differs significantly between firms in G7 countries and firms in BRICS+ countries.

The interaction between the Environment, Social, and Governance pillars and the Region towards the CoE was statistically significant, as reflected by the significant p-values. Similarly, it can be explained

by Owolabi et al findings, which show that ESG practices reduce risk, leading to lower equity risk premiums for investors (Owolabi et al., 2024). Thus, hypothesis H2c is supported, indicating that the effect of Environment, Social, and Governance pillars on the CoE significantly differs between G7 and BRICS+ firms.

4.6.2.4 Hypothesis 2d

H2d: The negative effect of the Environment (E) pillar on the WACC differs significantly between firms in G7 countries and firms in BRICS countries.

The interaction between the Environment pillar and the Region towards the WACC was weak and statistically significant, as shown by the p-value (0.058). WACC is a weighted average of the CoE and the CoD. The strong ESG effect observed for the CoE may be diluted by the absence of a similar effect on the CoD. As a result, the opposing magnitudes offset one another, producing a weaker and statistically insignificant overall impact on WACC. Therefore, hypothesis H2d is supported, indicating that the effect of the Environment pillar on WACC does significantly differ between G7 and BRICS+ firms.

4.6.2.5 Hypothesis 2e

H2e: The negative effect of the Environment (E) pillar on the CoD differs significantly between firms in G7 countries and firms in BRICS+ countries.

The interaction between the Environment pillar and the Region towards the CoD was weak and statistically significant, as shown by the insignificant p-value (0.198). These contrasting findings exist,

including one study on US-listed companies that associated the environmental score with higher loan spreads by the firms (Carnevale and Drago, 2024). Hence, hypothesis H2e is not supported, indicating that the effect of the Environment pillar on the CoD does not differ significantly between G7 and BRICS+ firms.

4.6.2.6 Hypothesis 2f

H2f: The negative effect of the Environment (E) pillar on the CoE differs significantly between firms in G7 countries and firms in BRICS+ countries.

The interaction between the Environment pillar and the Region towards the CoE was weak and statistically significant, as shown by the significant p-value of 0.000. This is consistent with research by Owolabi et al. and Apergis et al. showing that effective ecological risk management techniques reduce the CoE (Owolabi et al., 2024). Conversely, firms with great environmental concerns are charged by investors with a higher expected CoE (Apergis et al., 2022). Therefore, hypothesis H2f is supported, indicating that the effect of the Environment pillar on CoE does significantly differ between G7 and BRICS+ firms.

4.6.2.7 Hypothesis 2g

H2g: The negative effect of the Social (S) pillar on the WACC differs significantly between firms in G7 countries and firms in BRICS+ countries.

The interaction between the Social pillar and the Region towards the WACC was weak and statistically significant, as shown by the p-

value (0.123). WACC is a weighted average of the CoE and the CoD. The absence of a similar effect on the CoD may dilute the strong ESG effect observed for the CoE. As a result, the opposing magnitudes offset one another, producing a weaker and statistically insignificant overall impact on WACC. Therefore, hypothesis H2g is not supported, indicating that the effect of the Social pillar on WACC does not significantly differ between G7 and BRICS+ firms.

4.6.2.8 Hypothesis 2h

H2h: The negative effect of the Social (S) pillar on the CoD differs significantly between firms in G7 countries and firms in BRICS+ countries.

The interaction between the Social pillar and the Region towards the CoD was weak and statistically significant, as shown by the insignificant p-value (0.135). According to the Apergis et al. study, funding social activities is an extra expense or may even destroy value, which could raise the cost of bank loans for the firms (Apergis et al., 2022). Hence, hypothesis H2h is not supported, indicating that the effect of the Social pillar on the CoD does not differ significantly between G7 and BRICS+ firms.

4.6.2.9 Hypothesis 2i

H2i: The negative effect of the Social (S) pillar on the CoE differs significantly between firms in G7 countries and firms in BRICS+ countries.

The interaction between the Social pillar and the Region towards the CoE was weak and statistically significant (p-value of 0.000). In the research of Postiglione et al., the relationship between the Social

pillar and the CoE has been observed to be only marginal in some academic studies (Postiglione et al., 2024). Therefore, hypothesis H2i is supported, indicating that the effect of the Social pillar on CoE does significantly differ between G7 and BRICS+ firms.

4.6.2.10 Hypothesis 2j

H2j: The negative effect of the Governance (G) pillar on the weighted average cost of capital (WACC) differs significantly between firms in G7 countries and firms in BRICS+ countries.

The interaction between the Governance pillar and the Region towards the WACC was weak and statistically significant, as shown by the p-value (0.124). WACC is a weighted average of the CoE and the CoD. The absence of a similar effect on the CoD may dilute the strong ESG effect observed for the CoE. As a result, the opposing magnitudes offset one another, producing a weaker and statistically insignificant overall impact on WACC. Therefore, hypothesis H2j is not supported, indicating that the effect of the Governance pillar on WACC does not significantly differ between G7 and BRICS+ firms.

4.6.2.11 Hypothesis 2k

H2k: The negative effect of the Governance (G) pillar on the cost of debt differs significantly between firms in G7 countries and firms in BRICS+ countries.

The interaction between the Governance pillar and the Region towards the CoD was weak and statistically significant, as shown by the insignificant p-value (0.618). Some early studies by Carnevale

and Drago did not detect any statistically significant role for borrowers' governance in determining loan spreads (Carnevale and Drago, 2024). Hence, hypothesis H2k is not supported, indicating that the effect of the Governance pillar on the CoD does not differ significantly between G7 and BRICS+ firms.

4.6.2.12 Hypothesis 2l

H2l: The negative effect of the Governance (G) pillar on the cost of equity differs significantly between firms in G7 countries and firms in BRICS+ countries.

The interaction between the Governance pillar and the Region towards the CoE was weak and statistically significant, as shown by the significant p-value of 0.000. Similarly, Postiglione et al. also stated that strong governance performance, by improving transparency and mitigating agency conflicts, is associated with lowering the CoE (Postiglione et al., 2024). Therefore, hypothesis H2l is supported, indicating that the effect of the Governance pillar on CoE does significantly differ between G7 and BRICS+ firms.

4.6.3 Hypothesis 3

4.6.3.1 Hypothesis 3a

H3a: Institutional quality moderates the relationship between ESG performance and the WACC in G7 countries and BRICS+ countries, such that the negative effect of ESG performance is stronger in

countries with higher institutional quality and stronger ESG regulatory frameworks.

The interaction between ESG and Region towards the WACC after the moderating effect is weakly statistically significant. This strongly implies that poor Institutional Quality is associated with an increase in costs, and vice versa (Hu, T., 2025). Therefore, hypothesis H3a is not supported, indicating that the effect of ESG on WACC after the moderating effect significantly differs between G7 and BRICS+ firms.

4.6.3.2 Hypothesis 3b

H3b: Institutional quality moderates the relationship between ESG performance and the CoD in G7 countries and BRICS+ countries, such that the negative effect of ESG performance is stronger in countries with higher institutional quality and stronger ESG regulatory frameworks.

The interaction between ESG and Region towards the CoD after the moderating effect was not statistically significant. If ESG's relation to CoD is mixed or fragile, the moderating role of IQ on that relation may also be inconsistent or insignificant (Kevser et al., 2024). Therefore, hypothesis H3b is not supported, indicating that the effect of ESG on the CoD after the moderating effect does not differ significantly between G7 and BRICS+ firms.

4.6.3.3 Hypothesis 3c

H3c: Institutional quality moderates the relationship between ESG performance and the CoE in G7 countries and BRICS+ countries, such that the negative effect of ESG performance is stronger in countries with higher institutional quality and stronger ESG regulatory frameworks.

The interaction between ESG and Region towards the CoE after the moderating effect was statistically significant. Strong ESG performance, which relies on adequate institutional backing, is consistently linked to a lower equity risk premium (Postiglione et al., 2024). Thus, hypothesis H3c is supported, indicating that the effect of ESG on the CoE after the moderating effect significantly differs between G7 and BRICS+ firms.

4.6.3.4 Hypothesis 3d

H3d: Institutional quality moderates the relationship between E, S, and G pillars and the WACC in G7 countries and BRICS+ countries, such that the negative effect of ESG performance is stronger in countries with higher institutional quality and stronger ESG regulatory frameworks.

The interaction between Environment, Social, and Governance with the Region towards the WACC after the moderating effect is weakly statistically significant. This strongly implies that poor Institutional Quality is associated with an increase in costs, and vice versa (Hu, T., 2025). Therefore, hypothesis H3a is not supported, indicating that the effect of E, S, and G pillars on WACC after the moderating effect significantly differs between G7 and BRICS+ firms.

4.6.3.5 Hypothesis 3e

H3e: Institutional quality moderates the relationship between E, S, and G pillars and the CoD in G7 countries and BRICS+ countries, such that the negative effect of ESG performance is stronger in countries with higher institutional quality and stronger ESG regulatory frameworks.

The interaction between E, S, and G pillars with the Region towards the CoD after the moderating effect was not statistically significant. If ESG's relation to CoD is mixed or fragile, the moderating role of IQ on that relation may also be inconsistent or insignificant (Kevser et al., 2024). Therefore, hypothesis H3b is not supported, indicating that the effect of E, S, and G pillars on the CoD after the moderating effect does not differ significantly between G7 and BRICS+ firms.

4.6.3.6 Hypothesis 3f

H3f: Institutional quality moderates the relationship between E, S, and G pillars and the CoE in G7 countries and BRICS+ countries, such that the negative effect of ESG performance is stronger in countries with higher institutional quality and stronger ESG regulatory frameworks.

The interaction between E, S, and G pillars with the Region towards the CoE after the moderating effect was statistically significant. Strong ESG performance, which relies on adequate institutional backing, is consistently linked to a lower equity risk premium (Postiglione et al., 2024). Thus, hypothesis H3f is supported, indicating that the effect of E, S, and G pillars on the CoE after the moderating effect significantly differs between G7 and BRICS+ firms.

4.7 Summary of Key Findings

In short, the results indicate that the effects of ESG performance differ substantially across cost of capital components and between G7 and BRICS+ firms. The WACC and CoD are typically not significantly impacted by ESG performance or its individual pillars, indicating that debt markets are still largely unresponsive to ESG signals across regions. In contrast, ESG performance, especially the individual pillars, significantly affects and lowers equity financing costs. The CoE continuously shows considerable disparities between G7 and BRICS+ firms. Furthermore, institutional quality emerges as an important conditioning factor only for equity-related outcomes, significantly strengthening the relationship between them, while showing no meaningful moderating effect for CoD or WACC. Together, these findings imply that institutional contexts are crucial in determining how investors react to ESG performance and that ESG and institutional variables are mostly priced through equity markets rather than debt markets.

CHAPTER 5: DISCUSSION AND CONCLUSION

5.1 Introduction

Chapter 5 summarizes the study through a discussion on the key empirical findings, highlighting their implications, acknowledging limitations, and providing recommendations for future studies. This study's main goal was to investigate how ESG performance affects businesses' cost of financing in various institutional contexts., with a comparative focus on the G7 (developed economies) and BRICS+ (emerging economies) groups. The study specifically investigated whether ESG performance and its individual pillars (Environmental, Social, and Governance) affect the WACC, CoD, CoE, and whether institutional quality moderates these relationships.

The empirical results show that ESG performance has a significant and negative effect on the CoE, indicating that equity investors reward firms with stronger sustainability and governance practices by demanding lower returns. However, ESG performance does not significantly influence the CoD or WACC, suggesting that debt markets remain less responsive to ESG signals and rely more on traditional credit risk measures. Among the three ESG pillars, governance emerges as the most influential factor, exhibiting a strong negative relationship with equity financing costs. Furthermore, the moderating effect of institutional quality is found to be significant only for the CoE, where stronger institutional environments enhance the risk-reducing role of governance. No moderation effect is observed for the CoD or WACC.

Overall, the results support the notion that equity markets more strongly perceive the financial benefits of ESG performance, particularly in countries with robust institutional frameworks. The theoretical and practical ramifications of these findings are examined in the following sections, which are followed by limitations, suggestions for future research, and concluding remarks.

5.2 Discussion of Key Findings

5.2.1 Discussion for Research Question 1

The findings show that the ESG Composite score does not affect CoD and WACC. However, it presents strong and significant results in reducing the CoE. The reason behind the lack of a significant effect on the CoD is supported explicitly or implicitly by some research. The existing academic literature regarding the comprehensive ESG score presents mixed results on financing costs, indicating a lack of widely dominant literature propositions establishing a clear negative relationship between them (Apergis et al., 2022). Besides, findings from Apergis et al stated about the insufficiency of ESG Composite Score, where research often acknowledges that the total ESG score may produce "statistical insignificance" and contends that in order to provide statistical relevance, overall performance must be broken down into its component pillars (Apergis et al., 2022).

Meanwhile, the characteristics of the ESG composite score itself introduce noise and uncertainty, which debt providers find unappealing. This is because ESG ratings from different providers disagree substantially, limiting the composite score's reliability (Berg et al., 2022). The efficacy of ESG as a financial signal is weakened by this divergence, which also raises informational uncertainty. Lenders may be hesitant to depend significantly on a metric that is highly controversial because they need certainty. Moreover, debt providers rely heavily on established financial metrics, such as credit ratings and fundamental financial ratios, which severely overshadow the influence of the ESG composite score. When determining the bond yield, a company's overall financial status as assessed by its total credit rating frequently takes precedence over the ESG score (Apergis et al., 2022).

In contrast, the significant effect of the ESG Composite Score on the CoE is supported by several findings as well. A core reason for the ESG impact

on CoE is the reduction in non-diversifiable, or systematic risk, Beta. As stated by Albuquerque et al., since Beta is the major parameter used in estimating the CoE, a lower CoE should be applied to firms that score strongly on ESG metrics (Albuquerque et al., 2019).

By addressing the issue of asymmetric information, ESG scores offer investors a more accurate evaluation of the company's long-term sustainability and risk management, as proven by the research (Cheng et al., 2025). The increased transparency lowers uncertainty and, thus, investors' equity risk premium.

Besides, it is aligned with the Stakeholder Theory. Due to market segmentation and lower projected returns, ESG performance attracts investors who care about sustainability, which lowers the CoE. For stocks with high ESG scores, investors who prioritize ESG are prepared to accept a trade-off between lower projected returns (Postiglione et al., 2024). As a result of this higher demand, stock prices rise, and investors' desired future return is reduced. While other studies explicitly conclude that a higher ESG rating will reduce the company's CoE, which ultimately leads to higher prices and thus higher firm value (Postiglione et al., 2024).

Hence, this will lead to the firm's WACC being insignificant. Since WACC is a weighted average of the CoD and the CoE, the absence of a similar effect on the CoD may dilute the strong ESG effect observed for the CoE. As a result, the opposing magnitudes offset one another, producing a weaker and statistically insignificant overall impact on WACC.

The results also show that the impact of ESG on the cost of capital measures is weaker in the BRICS+ countries than in the G7 countries. In contrast to the industrialized economies of the G7, the financial benefits of ESG initiatives in the BRICS countries are frequently contingent upon the domestic institutional context, which itself reflects distinct stages of economic development and national interests. Developing nations, including those in the BRICS bloc, frequently place a higher priority on basic socioeconomic necessities, such as infrastructure development and

poverty alleviation, than on more complex environmental and governance issues (Gupta et al., 2025).

5.2.2 Discussion for Research Question 2

RQ 2 will discuss the effects of the three individual ESG pillars also present similar results to the previous. In terms of the Environment pillar, the strong negative correlation between high environmental performance and the CoE is primarily driven by the reduction of systematic risk (Beta) and improved investor perception. This is because equity investors view environmental performance as an effective risk management strategy. Albuquerque et al. further showed that firms that adopt ESG are typically engaged in a product differentiation strategy that leads to a lower elasticity of profits to aggregate shocks (Albuquerque et al., 2019).

Overall, the research by Owolabi et al. indicates that investors charge higher projected CoE to companies that have environmental risks. On the other hand, successful ecological risk management techniques result in a noticeable reduction in the CoE (Owolabi et al., 2024). Furthermore, strong environmental practices reduce the firm's risk profile, leading to greater investor confidence and higher valuation. Other findings also indicate that the Environmental scores support the firm's long-term sustainability signal (Apergis et al., 2022). Lower environmental risk is rewarded by the market through a lower CoE (Albuquerque et al., 2019).

In contrast, research consistently shows that corporations with serious environmental concerns must pay significantly higher interest rates on their loans (Apergis et al., 2022). Lenders are often quick to penalize poor environmental performance with higher loan spreads, but they may not uniformly reward good performance with lower spreads. If the positive effects of environmental efforts are not consistently translated into measurable debt cost reductions, the overall average effect in a specific sample might register as insignificant (Carnevale and Drago, 2024).

While the Social pillar reflects identical results. A strong social performance is viewed as reducing risk, leading to lower equity risk premiums for investors, as evidenced by Hu, T.'s studies (Hu, T., 2025). Therefore, this aligns with the key findings where the Social pillar shows a significantly negative impact on the CoE. Besides, it is proven that firms with robust social capital, measured analogously to ESG ratings, were observed to have higher stock returns during the 2008–2009 financial crisis, implying that this social capital reduced systematic risk for equity holders during market disruptions (Bagh, T. et al., 2025).

Additionally, managerial characteristics that cause the low-volatility anomaly and Bowman's paradox are correlated with ESG compliance, particularly the S pillar, and may even act as a stand-in. This suggests that these traits improve financial performance and lower volatility (Apergis et al., 2022). Moreover, it also builds stakeholder trust and resilience, where a high social performance signals a positive relationship with key stakeholders such as employees and, community. Hence, leading to greater resilience, becoming a factor highly valued by equity investors concerned with long-term firm value. This is further evidence by Bagh, T. et al., who indicated that the positive correlation between social capital and firm value during the financial crisis suggests that the market rewards strong social performance as it improves trust and firm resilience in times of stress (Bagh, T. et al., 2025).

Meanwhile, there is a lack of a significant relationship with the CoD. The research presents conflicting results across various datasets and time periods, indicating that the expected negative relationship between the Social pillar and the CoD is not conclusive. Besides, the financial impact of social investments is frequently less direct or predictable than that of environmental risks, which makes lenders cautious when evaluating the overall social score (Apergis et al., 2022).

Lenders may also treat certain social initiatives as an additional cost burden rather than a clear risk reduction, which could result in higher bank loan costs (Carnevale and Drago, 2024). The overall statistical significance of

the composite Social score in debt pricing models may be weakened by this skepticism. According to Taddeo et al., short-term costs associated with corporate Social activities may negatively impact a company's financial success (Taddeo et al., 2024). These early cost worries may be reflected in the assessment made by lenders, who are primarily concerned with short-term solvency and repayment capabilities.

Next, the Governance pillar's function is to reduce investor risk, promote information flow, and strengthen company management. All of which are closely aligned with shareholder interests, making it significant in reducing the CoE. It improves the management and transparency of a firm. Strong governance performance, by enhancing transparency and strengthening management structure, is associated with positively affecting profitability and market valuation (Taddeo et al., 2024).

Then, Taddeo et al. further explain that aligning managerial choices with shareholder interests is made easier by good governance processes. This strong control lowers the necessary CoE by reducing agency costs, or conflicts of interest between managers and owners (Taddeo et al., 2024). Therefore, the Governance pillar consistently contributes to enhancing corporate performance overall. Investors perceive well-governed firms as more stable and less prone to unexpected losses, reducing the risk premium factored into the CoE.

Lenders can get information on governance from a number of sources other than ESG scores, according to the literature (Carnevale and Drago, 2024). Creditors employ well-established credit rating and scoring techniques that already include an evaluation of a company's management quality, which is intrinsically related to the Governance pillar (Apergis et al., 2022). Due to creditors' primary focus on the overall credit rating, which already takes ESG factors into account, the Governance pillar score's individual contribution may be negligible or challenging to separate, resulting in results that are statistically insignificant.

5.2.3 Discussion for Research Question 3

While having Institutional Quality as the moderator, the results still show a similar direction, as ESG also negatively significantly affects the CoE with the moderating effect. A trade-off between lower expected returns for firms with strong ESG scores is frequently accepted by equity investors, particularly those dedicated to sustainable practices (Cheng et al., 2025). The ESG signal is seen as more credible when Institutional Quality is high, which draws in this capital and reduces the CoE (Wen, J. et al, 2025). In environments with strong Institutional Quality, mechanisms like legal transparency and disclosure are validated, which enhances the signaling value of ESG information for equity investors. Hence, making the relationship more reliable and thus significant.

On the other hand, the Firm Size and Leverage in each model show a result in low adjusted R-squared, which is consistent with findings in past research. The most critical factor is often the unsuitability of the linear model to adequately capture the true, often complex relationships between firm characteristics and the outcome variable. The research by Cheng et al. indicates that traditional econometric models, including linear regression, may be unsuitable for capturing the nonlinear effects of firm-level determinants on performance metrics, especially those related to ESG (Cheng et al., 2025). These models frequently fail to accurately reflect the underlying functional form if it deviates from linearity, since they presume a linear relationship. His previous research, which examined the Hong Kong Stock Exchange-listed firms, directly supports this problem. When a Linear Regression Model (LRM) was run using firm characteristics, such as Size and Total Debt Ratio, it produced a notably low adjusted R-squared value of 0.19 (Cheng et al., 2025).

However, the low explanatory power of the result might be due to other causes. It is possible due to the omission of other key variables, such as Return on Equity, Return on Assets, or Book-to-Market ratio. As they might

have a higher impact on explaining these models. Besides, the other reason could be that the debt markets in the BRICS+ countries rely more on state-owned bank relationships than ESG scores. Given the results on the role of financial institutions versus market-based financing, the claim that debt markets in the BRICS countries depend more on state-owned bank ties than ESG scores seems tenable. In general, research often focuses on syndicated loans for large, listed firms, which represent a minority share of bank borrowers (Carnevale and Drago, 2024).

5.3 Implications of the Study

This research provides a meaningful academic contribution by addressing a clear gap in the ESG literature, specifically, the lack of comparative evidence on how ESG performance influences the cost of capital across different stages of economic development. This study explicitly compares the G7 and BRICS+ economies, emphasizing how institutional context affects financial outcomes, whereas past findings have usually concentrated on the developed markets or particular developing countries. Besides, the study further expands theoretical knowledge of how governance circumstances affect the relationship between ESG and finance by including institutional quality as a moderator. As a result, the results give fresh empirical perspectives that enhance the literature on sustainability finance and lay the groundwork for further cross-national comparative research.

For companies and financial managers, this research provides practical information about how financing costs are impacted by ESG performance under different institutional settings. Firms operating in environments with strong governance and transparent regulations benefit more clearly from positive ESG performance, particularly through lower CoE. This implies that businesses can intentionally prioritize ESG projects as part of financial risk management and capital structure planning, in addition to doing so for moral or reputational reasons. Firms in the BRICS+ economies can also discover that, particularly in cases where institutional quality is lower, enhancing ESG performance may help them communicate credibility and lower perceived risk. Overall, the results help managers better align sustainability investments with financial decision-making.

From a policy standpoint, the results highlight how crucial it is to improve institutional openness, regulatory enforcement, and ESG reporting standards, especially in developing nations. Governments are crucial in allowing capital markets to reward sustainable companies, as evidenced by the fact that ESG effects on financing outcomes are more noticeable in stronger institutional contexts. Therefore, policymakers in BRICS+ and other emerging economies might strengthen oversight procedures, encourage harmonized sustainability reporting systems, and increase ESG disclosure requirements. These steps would encourage

more responsible investment, lessen knowledge asymmetry, and aid in the shift to more sustainable economic growth.

By showing that the financial advantages of ESG performance are predominantly represented in the CoE rather than the CoD or the total WACC, this study adds to the body of work on ESG and cost of capital. The findings indicate that equity investors, who bear residual risk and are more exposed to long-term environmental, social, governance, and institutional uncertainties, are more responsive to ESG information. This implies that ESG measurements can be useful markers of managerial caliber, resilience, and long-term stability. ESG scores can be included in risk assessment frameworks by investors looking to control portfolio risk or integrate sustainability into investment strategies. The findings also show that, in certain situations, ESG performance might not have a major impact on the CoD, indicating that investors must distinguish between different kinds of financial risk. Ultimately, the results assist investors in making better-informed, data-driven choices that support both financial and sustainability goals.

5.4 Limitations of the Study

Firstly, one of the limitations of this research is the restricted availability of consistent and comparable ESG data, especially for emerging economies. Since ESG disclosures are still optional in many countries, there are variations in the frequency, scope, and quality of reporting among firms. There are still firms and countries that lack complete or continuous ESG scores, which reduces the sample size and may introduce selection bias, as only firms with sufficient reporting are included. Similarly, the cost of capital components, especially the CoE, often rely on market-based inputs that vary across countries, and data gaps required the exclusion of certain firms and markets. This constraint may limit the generalizability of the findings, as the analysis is based only on firms with complete, usable data.

Secondly, the E, S, and G pillars of ESG scores in particular might not accurately represent a company's actual sustainability performance. Firms may participate in "greenwashing," which is the deliberate disclosure of positive information to give the impression that they are more sustainable without actually making any significant changes. Apart from that, ESG metrics globally are not standardized, as the firms differ in reporting depth, metrics, and emphasis. These inconsistencies lead to measurement error in ESG variables, which could weaken the detected relationships between ESG performance and the cost of capital. Consequently, the actual impact of ESG performance may be underestimated or misrepresented in the empirical results.

Thirdly, the study's indirect estimates of the CoD, CoE, and WACC were obtained using conventional financial models, including interest expense ratios and CAPM. For example, the CoD is measured using a backward-looking accounting-based indicator, which reflects interest expenses on existing loans that may have been issued several years earlier. As a result, current ESG performance may not influence these historical borrowing costs, potentially explaining the insignificant relationship observed between ESG and the CoD.

Fourthly, the study compares firms from G7 and BRICS+ countries; however, the number of countries included is still relatively small and does not represent the full spectrum of developed and developing economies. The representativeness of the sample is further impacted by the omission of some BRICS countries (such as South Africa and Russia) because of data unavailability. The results' restricted geographic coverage limits their external validity, since they could not apply to other areas with different institutional strengths, legal frameworks, or ESG maturity levels.

Lastly, Institutional Quality in this study is constructed as a simple average of six Worldwide Governance Indicators (WGI). While this method is practical and too simple, it does not account for the different importance or weights of each institutional dimension. In reality, factors like Rule of Law or Control of Corruption might be much more important for investors than other indicators. The averaging method also ignores potential interactions or nonlinearities among institutional components. As a result, the Institutional Quality index used may oversimplify

complex institutional environments, potentially reducing the precision of the moderating effect.

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5.5 Recommendations for Future Research

Given these limitations, some recommendations are provided for future studies to improve on this topic.

Firstly, future studies should revisit this analysis to obtain comprehensive and trustworthy ESG and cost-of-capital statistics for nations like South Africa and Russia that had to be left out owing to data limitations. Researchers will have access to a larger and more balanced sample that more accurately represents the entire BRICS group as ESG reporting becomes more standardized and required across markets. A full dataset would enable more robust cross-national comparisons, lessen sample bias, and improve the findings' generalizability to both rich and emerging economies.

Secondly, to address inconsistencies in ESG measurement, future studies should supplement database scores with firm-level sustainability reports, carbon emissions data, and third-party verified disclosures. Additionally, comparing ESG ratings from other organizations, including Bloomberg, S&P Global, Sustainalytics, and MSCI. By doing this, measurement error resulting from agency-specific approaches would be reduced. By combining ESG data from many sources, it is possible to assess a company's true sustainability performance more thoroughly and accurately while reducing the impact of disclosure manipulation or greenwashing.

Thirdly, future research should strive to collect actual firm-level cost-of-debt and cost-of-equity estimates directly from specialized databases, investment banking datasets, or credit agencies, as the cost of capital components in this study were determined indirectly using standard formulas. These sources frequently include comprehensive data on credit spreads, risk adjustments, loan contracts, and market-implied expectations. Having access to such high-quality data will significantly increase financial metrics' accuracy and lower model-based estimation errors, resulting in more trustworthy empirical findings. Besides, it is encouraged to employ forward-looking, market-based measures, such as credit spreads or bond yields at issuance. This can better capture the contemporaneous effect of ESG performance on firms’ debt financing costs.

Fourthly, future studies should consider expanding the country sample to include a broader range of emerging and developed markets, such as all emerging Asian economies or established regional blocs like the European Union (EU) or ASEAN. A larger and more diverse set of countries would capture greater variation in institutional quality, regulatory maturity, and ESG adoption. This extension would enhance the findings' external validity and enable researchers to investigate whether the ESG-cost-of-capital link acts differently in diverse cultural, political, and economic contexts.

Lastly, the Institutional Quality construct in this study was calculated using a simple average method, which treats all governance indicators as equally important. To obtain factor-based institutional quality scores, future studies might use more advanced techniques like Principal Component Analysis (PCA) or weighted composite index methods. These methodologies quantitatively detect the underlying structure of governance indicators and assign weights depending on their explanatory strength. Such techniques would provide a more accurate, data-driven depiction of institutional contexts and provide deeper insights into how particular governance aspects affect financial outcomes, although they are more time-consuming. To extend the understanding, it is suggested to use a weighted index or test specific governance indicators separately to see if one matters more than the others.

5.6 Concluding Remarks

This thesis is set out to examine whether and how ESG performance influences firms' cost of capital across different institutional and economic contexts, with a comparative focus on developed (G7) and developing (BRICS+) economies. The study addressed a significant research gap by separating the effects of ESG performance on the WACC, CoD, and CoE, while specifically taking institutional quality's moderating role into account. This was motivated by conflicting and inconclusive evidence in earlier literature.

Based on the empirical findings, a clear and consistent pattern in revealed. The ESG performance of a firm at both the composite level and individual pillars exerts a significant and meaningful effect on the CoE, particularly in those countries with higher Institutional Quality. In comparison, it does not significantly affect the CoD, and the overall impact on the WACC remains weak. These findings imply that the main channel via which ESG performance is priced is through equity investors, who are more sensitive to long-term risks, information asymmetry, and institutional credibility. The role of ESG in debt financing decisions appears to be limited by debt providers' apparent greater reliance on traditional credit risk considerations.

This work adds to a more complex understanding of sustainable finance by showing that the link between ESG and Cost of Capital is not consistent across financing instruments or across institutional contexts. It emphasizes the significance of institutional quality in converting ESG performance into observable financial gains and emphasizes that ESG is most important in areas where governance structures improve credibility and transparency. Overall, the results support the idea that ESG should be viewed as a context-dependent signal whose value is influenced by institutional strength, market structure, and investor behavior rather than as a uniform determinant of financing costs.

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