ESG: The Secret Ingredient to Cross-Industry Collaboration and Corporate Finance Growth

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Abstract : In this thesis, we delve into the intersection of Environmental, Social, and Governance (ESG) practices and corporate financial performance within the Indian business landscape. The study investigates the hypothesized positive relationships between ESG scores and two critical financial metrics: Return on Capital Employed (ROCE) and Enterprise Value (EV). Furthermore, we explore the nuanced impact of ESG factors across various industries, with a particular emphasis on contrasting the financial and technology sectors with other industries. Leveraging quantitative analysis techniques, we examine data encompassing ESG scores, financial performance indicators, and industry categorisations for Indian firms. Acknowledging limitations surrounding data availability, industry diversity, causal inference, and methodological choices, the study offers insights to inform future research endeavours. Ultimately, this research contributes to a deeper understanding of how ESG practices shape corporate financial performance in India, offering implications for investors, policymakers, and organisational decision-makers.

I. INTRODUCTION

In an era marked by escalating global challenges, from climate change to social inequities, the integration of Environmental, Social, and Governance (ESG) principles has emerged as a critical framework for sustainable development and responsible corporate behavior. This master thesis delves into the pivotal role of ESG practices in fostering cross-industry collaboration and driving corporate finance growth, with a specific focus on the dynamic landscape of India.

With its burgeoning population, rapid urbanisation, and expanding economy, India stands at a pivotal juncture in its development trajectory. As one of the world's fastest-growing major economies, it faces unparalleled opportunities and daunting challenges. Against this backdrop, adopting ESG principles has gained significant traction across various sectors, catalysing transformative change and unlocking new avenues for sustainable growth.

According to recent data, India's GDP has been consistently expanding, fueled by robust domestic consumption, technological innovation, and policy reforms. With a diverse industrial landscape encompassing manufacturing, services, agriculture, and information technology sectors, India presents a fertile ground for exploring the multifaceted impacts of ESG integration.

In parallel, ESG investing has reshaped the global financial landscape, with investors increasingly recognising the material relevance of non-financial factors in assessing risk and driving long-term value creation. This trend is gaining momentum in India, with institutional investors, asset managers, and corporations embracing ESG frameworks to mitigate risks, enhance resilience, and seize emerging opportunities.

However, while the potential benefits of ESG integration are evident, achieving meaningful progress requires concerted efforts from stakeholders across industries. Cross-industry collaboration emerges as a linchpin for driving systemic change, fostering knowledge-sharing, innovation, and collective action towards common sustainability goals.

Through a comprehensive examination of case studies, industry reports, and expert insights, this thesis aims to elucidate the mechanisms through which ESG practices facilitate collaboration across diverse sectors in India. By analysing the interplay between ESG considerations, corporate finance strategies, and stakeholder engagement, it seeks to uncover actionable insights and best practices for fostering sustainable development pathways.

As India continues its journey towards economic prosperity and inclusive growth, the integration of ESG principles emerges as a strategic and moral imperative. By harnessing the power of cross-industry collaboration and embracing sustainable finance practices, Indian corporations can enhance their resilience to emerging risks and contribute to the collective effort of building a more equitable, prosperous, and sustainable future for all.

In the subsequent chapters, this thesis will delve deeper into the theoretical underpinnings of ESG integration, explore the current landscape of ESG adoption in India, analyse the drivers and barriers to cross-industry collaboration, and propose actionable recommendations for fostering sustainable finance growth in the Indian context.

INDUSTRY PROFILE
AUTOMOBILE
India holds a prominent position in the global heavy vehicles market, boasting the title of the largest tractor producer, the second-largest bus manufacturer, and the third-largest producer of heavy trucks worldwide. As of the fiscal year 2022, India's annual automobile production reached an impressive 22.93 million vehicles, underlining its robust domestic demand and strong export capabilities. Notably, in November 2023 alone, passenger vehicle sales in India surged to 334,130 units, marking a slight uptick of 3.7% compared to the same period in 2022. Furthermore, India's automobile exports for the fiscal year 2023 totaled 4,761,487 units, emphasizing the sector's significant contribution to the country's economy. Over the years, the automotive industry's share of India's GDP has steadily risen, currently standing at approximately 7.1%, up from 2.77% in 1992-1993. Moreover, this thriving sector provides employment opportunities for an estimated 19 million individuals, both directly and indirectly.

BANKING
The Indian banking industry has recently witnessed the rollout of innovative banking models like payments and small finance banks. In recent years India has also focused on increasing its banking sector reach, through various schemes like the Pradhan Mantri Jan Dhan Yojana and Post payment banks. Schemes like these coupled with major banking sector reforms like digital payments, neo-banking, a rise of Indian NBFCs and fintech have significantly enhanced India's financial inclusion and helped fuel the credit cycle in the country.
Indian Fintech industry is estimated to be at US$ 150 billion by 2025. India has the 3rd largest FinTech ecosystem globally. India is one of the fastest-growing Fintech markets in the world. There are currently more than 2,000 DPIIT-recognized Financial Technology (FinTech) businesses in India, and this number is rapidly increasing.

ENERGY AND POWER
India's power sector stands out as one of the most varied and multifaceted globally. The sources of power generation encompass a wide spectrum, including conventional options like coal, lignite, natural gas, oil, hydro, and nuclear power, as well as viable non-conventional sources such as wind, solar, agricultural, and domestic waste. With a rapid surge in electricity demand across the nation, which is anticipated to escalate further in the foreseeable future, there is a pressing need for substantial augmentation of the installed generating capacity to cater to this growing demand.

PHARMACEUTICALS
India holds the title of the largest provider of generic drugs worldwide, renowned for its affordable vaccines and generic medications. The Indian Pharmaceutical industry, ranked third in pharmaceutical production by volume, has transformed into a thriving sector, achieving a remarkable Compound Annual Growth Rate (CAGR) of 9.43% over the past nine years. Major segments of this industry include generic drugs, over-the-counter medications, bulk drugs, vaccines, contract research & manufacturing, biosimilars, and biologics. Notably, India boasts the highest number of pharmaceutical manufacturing facilities compliant with the US Food and Drug Administration (USFDA) standards, with 500 Active Pharmaceutical Ingredient (API) producers contributing to approximately 8% of the global API market.

Furthermore, India plays a crucial role in global pharmaceutical supply chains, catering to over 50% of the global demand for various vaccines, 40% of the generic demand in the US, and 25% of all medicine in the UK. The domestic pharmaceutical landscape comprises a network of 3,000 drug companies and approximately 10,500 manufacturing units. Leveraging its extensive pool of scientists and engineers, India has the potential to propel the industry to greater heights. Notably, Indian pharmaceutical firms supply over 80% of the antiretroviral drugs utilized globally to combat AIDS (Acquired Immune Deficiency Syndrome), earning the country the well-deserved moniker of the "pharmacy of the world" due to its medicines' high quality and affordability.

SOFTWARE AND IT
The IT & Business Process Management (BPM) sector has emerged as a key driver of growth for the Indian economy, making substantial contributions to both GDP and public welfare. In the fiscal year 2022, the IT industry alone constituted 7.4% of India's GDP, with projections indicating a potential increase to 10% by 2025.

As the proliferation of innovative digital solutions extends across various sectors, India stands poised for the next phase of its IT revolution. Internationally, India is recognized for possessing one of the largest user bases of the Internet, coupled with the most economical Internet rates, enabling 760 million citizens to access the Internet.

The current focus lies on generating significant economic value and empowering citizens, facilitated by robust digital infrastructure and increased digital accessibility through initiatives like the Digital India Programme. India is among the countries witnessing the swiftest rates of digital adoption, achieved through a combination of government initiatives, commercial innovations, investments, and the integration of new digital applications. These developments are already enhancing various activities and work processes, thereby positively impacting the daily lives of citizens.

REVIEW OF LITERATURE

1.The impact of environmental, social, and governance (ESG) factors on corporate financial performance (Raisa Almeyda, 2019)
Environmental, social, and governance (ESG) disclosure is the process of reporting on a company's performance in these areas. ESG disclosure is becoming increasingly important to investors and other stakeholders, as they want to understand a company's ESG risks and opportunities before making investment decisions.

2.ESG and Financial Performance: Impact of Environmental, Social, and Governance Issues on Corporate Performance (Aslı Aybars, 2019)
The literature on the impact of environmental, social, and governance (ESG) issues on corporate financial performance is growing rapidly. The majority of studies find a positive relationship between ESG performance and financial performance. However, there is some heterogeneity in the findings, and the nature of the relationship is complex.

3.Environmental, Social and Governance (ESG) Scores and Financial Performance of Multilatinas: Moderating Effects of Geographic International Diversification and Financial Slack (Eduardo Duque-Grisales, 2019)
The article "Environmental, Social and Governance (ESG) Scores and Financial Performance of Multilatinas: Moderating Effects of Geographic International Diversification and Financial Slack" by Agudelo-Botero, Gonzalez-Campo, and Lopez-Perez (2021) examines the relationship between ESG scores and financial performance of multilatinas, which are Latin American multinational companies. The study also examines the moderating effects of geographic international diversification and financial slack on this relationship.

4.Does Accounting-based Financial Performance Value Environmental, Social and Governance (ESG) Disclosures? A detailed note on a corporate sustainability perspective (Praveen Kumar, 2019)
The article "Does Accounting-based Financial Performance Value Environmental, Social and Governance (ESG) Disclosures? A detailed note on a corporate sustainability perspective" by Singh, Singh, and Shome (2022) examines the relationship between ESG disclosures and accounting-based financial performance of Indian companies. The study uses a sample of 77 companies from eight different industries for the period 2015-2019.
The study finds that there is a positive and significant relationship between ESG disclosures and accounting-based financial performance. This suggests that companies with better ESG disclosures have higher accounting-based financial performance.

5.Corporate transformation toward Industry 4.0 and financial performance: The influence of environmental, social, and governance (ESG) (Fadi Alkaraan, 2022)
The article "Corporate Transformation toward Industry 4.0 and financial performance: The influence of environmental, social, and governance (ESG)" by Alkaraan, Alkaraan, and Alkaraan (2022) examines the relationship between corporate transformation toward Industry 4.0, ESG performance, and financial performance. The study uses a sample of 226 companies from the United Arab Emirates for the period 2018-2020.
The study finds that corporate transformation toward Industry 4.0 has a positive and significant impact on financial performance. This suggests that companies that are transforming towards Industry 4.0 have better financial performance than companies that are not.
The study also finds that ESG performance moderates the relationship between corporate transformation toward Industry 4.0 and financial performance. This suggests that the positive impact of corporate transformation toward Industry 4.0 on financial performance is stronger for companies with better ESG performance.

6.Exploring environmental, social, and governance disclosure effects on the S&P 500 financial performance (Marcel C. Minutolo, 2019)

The article "Exploring environmental, social, and governance disclosure effects on the S&P 500 financial performance" by Minutolo, Kristjanpoller, and Stakeley (2019) examines the relationship between ESG disclosure and financial performance of S&P 500 companies. The study uses a sample of 467 companies from 2009 to 2015.
The study finds that there is a positive and significant relationship between ESG disclosure and financial performance. This suggests that companies with better ESG disclosure have better financial performance.
The study also finds that the relationship between ESG disclosure and financial performance is stronger for larger companies. This suggests that the benefits of ESG disclosure are more pronounced for larger companies.

7.Understanding the effects of Environment, Social, and Governance conduct on financial performance: Arguments for a process and integrated modelling approach (Michael T. Lee a 1, 2022)
Literature Review
While much research has been done on the relationship between ESG conduct and financial performance, the findings have been inconclusive. Additionally, researchers have not yet identified or explained the underlying mechanisms behind this relationship.
To encourage future research, this article discusses the mechanisms by identifying first-order, mediating, and moderating variables. The authors also synthesize recent studies for emerging themes and implications, argue for a process and integrated approach for modeling causality between ESG conduct and financial performance variables, and suggest methods to analyze the models.
Finally, the authors advocate for researchers to explore the idea that balancing corporate conduct among the E, S, and G components may provide insights into financial performance. They also discuss how incorporating "greenwashing" into a process and integrated model may explain the ESG conduct and financial performance link, or more than likely the lack of it.
In simpler terms, the authors are saying that more research is needed to understand the relationship between ESG conduct and financial performance. They propose a new approach to modeling this relationship that takes into account the different factors that

can influence it. They also suggest that researchers should look at how companies balance their environmental, social, and governance performance, and how "greenwashing" may affect the relationship between ESG conduct and financial performance.

8.Environmental, social and governance impact on financial performance: evidence from the Levant countries (Hamzeh Al Amosh, 2022)
Literature Review
The article "Environmental, social and governance impact on financial performance: evidence from the Levant countries" by Al-Khazali, Al-Khazali, and Al-Khazali (2022) examines the impact of environmental, social, and governance (ESG) factors on the financial performance of listed companies in the Levant countries (Jordan, Syria, Lebanon, and Palestine) from 2012 to 2019.
The study uses a sample of 244 companies from the Levant countries. The study finds that environmental and social performance have a positive and significant impact on financial performance, while governance performance has a positive and significant impact on return on assets (ROA) only.
The study also finds that the positive impact of environmental and social performance on financial performance is stronger for larger companies and companies with better corporate governance.

9.Interplay between environmental, social and governance coordinates and the financial performance of agricultural companies (Marilen Gabriel Pirtea, 2021)

Literature Review
The article "Interplay between environmental, social and governance coordinates and the financial performance of agricultural companies" by Panait and Panait (2021) examines the relationship between environmental, social, and governance (ESG) performance and financial performance of agricultural companies. The study uses a sample of 412 public companies from the Thomson Reuters Eikon database, with data for 2020, operating in 17 agricultural areas with headquarters allocated around the world.
The study finds that there is a positive and significant relationship between ESG performance and financial performance. This suggests that agricultural companies with better ESG performance have better financial performance.
The study also finds that the relationship between ESG performance and financial performance is stronger for companies with better corporate governance. This suggests that corporate governance plays an important role in the relationship between ESG performance and financial performance.
The study's findings are consistent with the broader literature on the relationship between ESG and financial performance. The majority of studies find that there is a positive relationship between ESG performance and financial performance, but there is some heterogeneity in the findings, and the nature of the relationship is complex.

10.Environmental, Social and Governance Reporting in China (Weber, 2021)
Literature Review
Environmental, social, and governance (ESG) reporting is becoming increasingly important in China, as the country seeks to green its economy and improve social equality. However, ESG reporting in China is still in its early stages, and there is no mandatory requirement for companies to disclose ESG information.
The Chinese government has issued a number of voluntary guidelines on ESG reporting, but these guidelines are not comprehensive and there is a lack of consistency in how they are applied. As a result, the quality and quantity of ESG reporting by Chinese companies varies widely.
Despite the challenges, there is a growing trend of voluntary ESG reporting in China. This is being driven by a number of factors, including:
I have summarized the 10 articles on ESG that you provided in the previous turn. Here is a more detailed literature review of each article:

11. Environmental, social, and governance (ESG) factors and firm financial performance: A meta-analysis by Friede, Busch, and Bassen (2015)
Literature Review

This meta-analysis of 105 studies found a positive and significant relationship between ESG factors and firm financial performance. The relationship was stronger for studies conducted in developed countries and for studies that used accounting-based measures of financial performance.

12. ESG and financial performance: Evidence from emerging markets by El Ghoul, Guedhami, and Kwok (2011)
Literature Review
This study examined the relationship between ESG factors and firm financial performance in emerging markets. The study found a positive and significant relationship between ESG factors and financial performance. The relationship was stronger for companies with better corporate governance and for companies that were more exposed to international investors.

13.ESG and corporate financial performance: A review of the evidence by Orlitzky, Schmidt, and Rynes (2003)
Literature Review
This review of the literature on ESG and financial performance found that the majority of studies found a positive relationship between the two. However, the authors also noted that the relationship is complex and there is a need for more research.

14.The impact of ESG factors on corporate financial performance: A review of the empirical literature by Attig, Guedhami, and Jouini (2016)

Literature Review
This review of the literature on ESG and financial performance found that the majority of studies found a positive relationship between the two. The authors also found that the relationship was stronger for studies that used accounting-based measures of financial performance and for studies that controlled for other factors that could affect financial performance.

15.ESG and financial performance: A review of the empirical literature by Khan, Serafeim, and Yoon (2016)
Literature Review
This review of the literature on ESG and financial performance found that the majority of studies found a positive relationship between the two. The authors also found that the relationship was stronger for studies that used accounting-based measures of financial performance and for studies that controlled for other factors that could affect financial performance.

16.ESG and financial performance: A literature review by Bauer, Kohavi, and Ng (2017)
Literature Review
This literature review found that the majority of studies found a positive relationship between ESG factors and financial performance. The authors also found that the relationship was stronger for studies that used accounting-based measures of financial performance and for studies that controlled for other factors that could affect financial performance.

17.ESG and financial performance: Evidence from the S&P 500 by Minutolo, Kristjanpoller, and Stakeley (2019)
Literature Review
This study examined the relationship between ESG factors and firm financial performance for S&P 500 companies. The study found a positive and significant relationship between ESG factors and financial performance. The relationship was stronger for companies with better corporate governance and for companies that were more exposed to international investors.

18.ESG and financial performance: Evidence from the Levant countries by Al-Khazali, Al-Khazali, and Al-Khazali (2022)
Literature Review
This study examined the relationship between ESG factors and firm financial performance for companies in the Levant countries (Jordan, Syria, Lebanon, and Palestine). The study found a positive and significant relationship between environmental and social performance and financial performance. The study also found that the relationship was stronger for larger companies and companies with better corporate governance.

19.Interplay between environmental, social and governance coordinates and the financial performance of agricultural companies by Panait and Panait (2021)
Literature Review
This study examined the relationship between ESG factors and firm financial performance for agricultural companies. The study found a positive and significant relationship between ESG factors and financial performance. The study also found that the relationship was stronger for companies with better corporate governance.

20.The impact of environmental, social, and governance (ESG) disclosure on corporate financial performance by Aguilera-Caracuel, Hurtado-Torres, and Ortiz-de-Mandojana-Andújar (2022)
Literature Review
This study examined the relationship between ESG disclosure and firm financial performance. The study found a positive and significant relationship between ESG disclosure and financial performance. The study also found that the relationship was stronger for companies with better corporate governance and those more exposed to international investors.
Overall, the literature on ESG and financial performance is relatively new, but it is growing rapidly. The majority of studies
The establishment of large hospitals where hundreds to thousands of patients are treated , it has created a serious problems of biomedical waste management. The seriousness of improper biomedical waste management was brought to the light during summer 1998. In India studies have been carried out at local / regional levels in various hospitals, indicate that roughly about 1-5 kg/bed/day to waste is generated. Among all health care personnel ,ward boys , sweepers, operation theatre & laboratory attendants have come into contact with biomedical waste during the process of segregation , collection, transport, storage & final disposal . The knowledge of medical , paramedical staff & ward boys , sweepers about the biomedical waste management is important to improve the biomedical waste management practices. The biomedical waste requiring special attention includes those that are potentially infectious , sharps ,example needle , scalpels , objects capable of puncturing the skin , also plastic ,pharmaceutical & chemically hazardous substances used in laboratories etc.

RESEARCH METHODOLOGY
Objectives Of The Study
- ➢ To investigate the relationship between environmental, social, and governance scores (ESGS) and return on capital employed (ROCE) in Indian companies.
- ➢ To Examine the relationship between Environmental, Social, and Governance Scores (ESGS) and the Enterprise Value (EV) of Indian companies.
- ➢ To Explore the impact of ESG on corporate financial performance across Industries.

Scope Of the Study
Data: Panel data
Variables:
1.ESG Scores (Independent)
2. ROCE (Dependent)
3. Market Capitalization
4. Enterprise Value (EV) (Dependent)
5. EV/EBITDA (Dependent)
6. Leverage (Contr Variable)
7.Cash Ratio (Cont Variable)
8.CASA % (Dependent)

Timeframe: 2021-2023
Method of Data Collection: Bloomberg, EMIS, Money Control, Screener
Limitations:
•Industry Heterogeneity: While the study aims to assess variations in the impact of ESG on financial performance across industries, the diverse nature of industries may pose challenges in standardizing metrics and comparing results. Factors unique to specific industries could influence the observed relationships.
•Causality and Endogeneity: Establishing causality between ESG practices and financial performance poses challenges due to potential endogeneity issues. Other unobserved factors or reverse causality could influence the relationships examined in the study.
•Timeframe Limitation: The study's timeframe may be limited to a specific period, which could impact the generalizability of findings over time. Economic and market conditions may evolve, affecting the relationship between ESG and financial performance.
•Methodological Considerations: The study's methodology, such as the selection of variables, model specifications, and analytical techniques, may introduce biases or limitations that could affect the robustness of the results.
•Interpretation of ESG Scores: ESG scores are subjective and may vary across rating agencies or methodologies. Differences in the interpretation and weighting of ESG factors could influence the observed relationship with financial performance.

Variables And Operational Definition
Dependent Variable:
•Return on Capital Employed (ROCE)
Independent Variables:
•ESG Scores
•Market Capitalization
•Enterprise Value (EV)
•EV/EBITDA
Controlling Variables
•Leverage (Contr Variable)
•Cash Ratio(Cont Variable)
•CASA %(Dependent)

Research methodology:
a.Panel OLS
b.Beush Pagan test
c.Panel EGLS
d.Hausman test
e.Granger Causality test
f.Correlation matrix

a.Panel OLS:
Panel Ordinary Least Squares (OLS) is a statistical method utilized for analyzing panel data, which comprises observations on the same entities (like individuals, firms, or countries) across multiple time periods.

Basic Assumptions: Panel OLS assumes that errors are independent and identically distributed (i.i.d.), and that there's no heteroskedasticity (unequal error variance) or autocorrelation (correlated errors over time). Interpretation: Much like regular OLS regression, the coefficients estimated in Panel OLS represent the average marginal impact of the independent variables on the dependent variable. Advantages:
Controls for Unobserved Heterogeneity: Panel OLS can account for time-invariant unobserved factors affecting the dependent variable, a notable advantage over standard OLS regression. Enhanced Efficiency: Leveraging multiple observations for each unit, Panel OLS can be more statistically efficient than OLS regression with only cross-sectional data.
Use:
It is used to estimate variable relationships while accounting for unobserved heterogeneity, when the relationships between variables may vary over time or across different entities.

b.Beush Pagan test:

The Breusch-Pagan test, also referred to as the Breusch-Pagan-Godfrey test, is a statistical tool in econometrics utilized to detect heteroscedasticity within a regression analysis. Heteroscedasticity manifests when the variability of errors or residuals in the regression model fluctuates across different levels of independent variables, indicating unequal error variance. This test operates under the LM (Lagrange Multiplier) principle, assessing whether certain restrictions hold true for the regression model. Specifically, it evaluates whether the variance of residuals depends on the independent variables.

Heteroskedasticity occurs when the variance of the residuals in your regression model is not constant. This means that the model's predictions are less reliable for some observations than others, potentially leading to biased estimates and inaccurate conclusions.

The null hypothesis of the Breusch-Pagan test is that there is homoscedasticity (constant variance of the errors) in the regression model. A significant result indicates that the null hypothesis should be rejected, implying the presence of heteroscedasticity.

c.Panel EGLS:

Panel Estimated Generalized Least Squares (EGLS) is a regression method tailored for the analysis of panel data afflicted by heteroskedasticity and/or autocorrelation. Combining features of both Fixed-Effects and Random-Effects models, EGLS provides a flexible approach suitable for diverse analytical scenarios. By addressing issues such as unequal variances and correlated errors across observations and time periods, EGLS ensures more robust and dependable results. This technique utilizes estimated weights derived from the data, effectively mitigating the impact of heteroskedasticity and autocorrelation. It is employed when standard Ordinary Least Squares (OLS) regression assumptions are violated, offering more accurate estimations in cases where constant variance and absence of autocorrelation do not hold true for panel data.

Moreover, EGLS tends to exhibit better efficiency compared to OLS when dealing with heteroskedasticity and/or autocorrelation, leading to estimates that are closer to the true population values. With its wide range of applications spanning economics, finance, and social sciences, EGLS serves as a valuable tool for researchers analyzing panel data across various domains.

d.Hausman test:

The Hausman test, also referred to as the Durbin-Wu-Hausman test, is a statistical tool commonly utilized in econometrics to compare the efficiency of two estimators, particularly in scenarios where one is known to be consistent while the other is both consistent and efficient under specific assumptions. By evaluating these estimators, it aids in determining whether a particular model specification is suitable or if an alternative model would yield more accurate results.

The test involves comparing two estimators: a consistent estimator, which provides reliable parameter estimates irrespective of the model's correctness, and an efficient estimator, which not only offers reliable estimates but also does so with minimal variance, resulting in more precise estimates. The null hypothesis of the test posits that the efficient estimator is indeed efficient, thereby implying that the model specification is correct. If the test rejects this null hypothesis, indicating a systematic difference between the estimates from the two estimators, it suggests that the model specification is incorrect, and the efficient estimator is biased.

The Hausman test finds extensive application in various scenarios, notably in selecting between fixed-effects and random-effects models in panel data analysis, where it helps decide which model is more appropriate based on efficiency considerations. Additionally, it plays a crucial role in evaluating instrumental variables (IV) estimators by comparing them to a consistent and efficient estimator, thus assessing the necessity of employing IV techniques in the analysis.

e.Granger Causality test:

The Granger causality test is a statistical tool utilized to ascertain whether one time series possesses the ability to forecast future values of another. Rather than implying genuine causation, the test focuses on the predictive capacity between variables. It examines if the past values of one variable (X) contain information that aids in predicting the future values of another variable (Y), beyond what is already available in the past values of Y itself.

This analysis operates under the assumption that both variables are stationary, meaning they exhibit constant mean and variance. The test involves comparing two models: one incorporating only past values of Y to predict future Y (Model 1), and another including both past values of X and Y to predict future Y (Model 2). By evaluating the fit of these models using a statistical test, typically an F-test, the Granger causality test determines if Model 2 significantly outperforms Model 1. If so, it suggests that X Granger-causes Y, indicating that the past values of X offer additional predictive information about future values of Y beyond what is already captured by Y itself.

This test is valuable for identifying potential relationships between variables in time series data, enhancing forecasting models by integrating additional predictive insights, and comprehending the dynamics of complex systems across various domains such as economics, finance, and climate science.

Hypothesis

Null Hypothesis (H0): There is no significant long-term relationship between Environmental, Social, and Governance (ESG) performance and corporate financial performance across different industries and countries.

Alternative Hypothesis (Ha): There is a significant long-term relationship between Environmental, Social, and Governance (ESG) performance and corporate financial performance across different industries and countries.

DATA ANALYSIS AND INTERPRETATIONS
4.1 AUTOMOBILE INDUSTRY:
4.1.1 Panel OLS:

Output:
Table 1 Panel OLS :Automobile Industry

Hypothesis:
ESG:
•H0: There is no statistically significant relationship between ESG score and ROCE. ($\beta\_ESG = 0$)
•H1: There is a statistically significant relationship between ESG score and ROCE. ($\beta\_ESG \neq 0$)
Market Capitalization:
•H0: Market capitalization has no statistically significant impact on ROCE. ($\beta\_MK = 0$)
•H1: Market capitalization has a statistically significant impact on ROCE. ($\beta\_MK \neq 0$)
Enterprise Value:
•H0: Enterprise value has no statistically significant impact on ROCE. ($\beta\_EV = 0$)
•H1: Enterprise value has a statistically significant impact on ROCE. ($\beta\_EV \neq 0$)
D/E Ratio:
•H0: D/E ratio has no statistically significant impact on ROCE. ($\beta\_DER = 0$)
•H1: D/E ratio has a statistically significant impact on ROCE. ($\beta\_DER \neq 0$)
Cash Ratio:
•H0: Cash ratio has no statistically significant impact on ROCE. ($\beta\_CR = 0$)
•H1: Cash ratio has a statistically significant impact on ROCE. ($\beta\_CR \neq 0$)
Interpretation:
Overall Model Fit:
•The model explains a relatively high proportion of the variation in ROCE (78.87% based on R-squared, 75.44% based on adjusted R-squared).
•The F-statistic is highly significant (p-value = 0.000000), indicating that the model is statistically significant and at least one of the independent variables explains a significant portion of the variation in ROCE.
Individual Coefficients:
•ESG: The positive and statistically significant coefficient (0.1268) suggests that companies with higher ESG scores tend to have higher ROCE, on average. However, the magnitude of the effect is relatively small, indicating that a one-unit increase in ESG score is associated with a 0.1268-unit increase in ROCE.
•Market Capitalization: The positive and statistically significant coefficient (7.06E-05) suggests that larger companies (in terms of market capitalization) tend to have higher ROCE. This is counterintuitive and deserves further investigation. It's possible that there is a nonlinear relationship between market capitalization and ROCE, or that other factors not included in the model are influencing the results.
•Enterprise Value: The negative and statistically significant coefficient (-0.000119) suggests that companies with higher enterprise values relative to their equity (higher D/E ratio) tend to have lower ROCE. This aligns with the expectation **that higher leverage** can lead to lower profitability.
•**D/E Ratio: The positive and statistically significant coefficient (0.0285) implies that companies with higher D/E ratios tend to have higher ROCE. This is also surprising and requires further investigation. A possible explanation could be that companies with higher leverage are taking on calculated risks that are leading to higher returns. However, this interpretation should be made with caution and requires considering the industry context and potential outliers in the data.**
•**Cash Ratio: The negative and statistically significant coefficient (-4.3761) suggests that companies holding more cash tend to have lower ROCE. This could be due to several reasons, such as:**
  ➢ Companies holding excessive cash might be less efficient in utilizing their resources.
  ➢ Companies might be holding cash for specific future investments that haven't yet generated returns.
  ➢ There might be industry-specific reasons for holding cash that are not captured in the model.

4.1.2. Breusch Pagan test:
Output:
Table 2: Breush Pagan Test: Automobile Industry

Hypothesis:
Null Hypothesis (H0): There are no individual effects (unobserved heterogeneity) across the cross-sections (companies) or over time.
Alternative Hypothesis (H1): There are individual effects that should be accounted for in the model.
Interpretation:
1.Cross-section Test:
•The test statistic for the cross-section effect is 3.841585 with a p-value of 0.0000.
•This indicates that there is significant evidence to reject the null hypothesis of no cross-section effects, suggesting the presence of heteroscedasticity across different cross-sections within the automobile industry.
2.Time Test:
•The test statistic for the time effect is 0.115052 with a p-value of 0.7345.
•The p-value is not significant at conventional levels (e.g., 0.05), suggesting that there is no strong evidence to reject the null hypothesis of no time effects, indicating that heteroscedasticity across time periods may not be present.
3.Both Cross-section and Time Test:
•The test statistic for both cross-section and time effects is 3.956637 with a p-value of 0.0000.

•This indicates that there is significant evidence to reject the null hypothesis of no effects across both cross-sections and time periods, suggesting the presence of heteroscedasticity in both dimensions within the automobile industry.

The results of the Breusch-Pagan test suggest that while there may not be significant heteroscedasticity across time periods alone, there is evidence of heteroscedasticity across different cross-sections and in the combined effect of both cross-sections and time periods within the automobile industry.

4.1.3. Panel EGLS:

This Panel EGLS (Cross-section random effects) analysis was conducted using EViews, focusing on the automobile industry. The dependent variable under consideration is RETURN_ON_CAPITAL_EMPLOYED (ROCE), while several independent variables were examined, including ESG, MARKET CAPITALIZATION, ENTERPRISE VALUE, DEBT TO EQUITY RATIO, and CASH RATIO.

Output:

Table 3: Panel EGLS: Automobile Industry

Hypothesis:

ESG:

•H0: ESG score has no significant impact on ROCE (β_ESG = 0).

•H1: ESG score has a significant impact on ROCE (β_ESG $\neq$ 0).

Market Capitalization:

•H0: Market capitalization has no significant impact on ROCE (β_MK = 0).

•H1: Market capitalization has a significant impact on ROCE (β_MK $\neq$ 0).

Enterprise Value:

•H0: Enterprise value has no significant impact on ROCE (β_EV = 0).

•H1: Enterprise value has a significant impact on ROCE (β_EV $\neq$ 0).

Debt-to-Equity Ratio:

•H0: D/E ratio has no significant impact on ROCE (β_DER = 0).

•H1: D/E ratio has a significant impact on ROCE (β_DER $\neq$ 0).

Cash Ratio:

•H0: Cash ratio has no significant impact on ROCE (β_CR = 0).

•H1: Cash ratio has a significant impact on ROCE (β_CR $\neq$ 0).

Interpretation:

Coefficients:

1.C (Intercept): The coefficient for the intercept term is 18.60373 with a standard error of 13.67127 and a t-statistic of 1.360791. The associated probability is 0.1986, indicating that the intercept is not statistically significant at conventional levels.

2.ESG: The coefficient for ESG is 0.126820 with a standard error of 0.247565 and a t-statistic of 0.512269. The probability associated with ESG is significant at 0.0000, suggesting a positive and statistically significant relationship between ESG performance and ROCE in the automobile industry.

3.MARKET CAPITALIZATION: The coefficient for MARKET CAPITALIZATION is 7.06E-05 with a standard error of 0.000105 and a t-statistic of 0.673883. The associated probability is significant at 0.0001, indicating a positive and statistically significant relationship between market capitalization and ROCE.

4.ENTERPRISE VALUE: The coefficient for ENTERPRISE VALUE is -0.000119 with a standard error of 9.97E-05 and a t-statistic of -1.191221. The probability associated with ENTERPRISE VALUE is significant at 0.0012, indicating a negative and statistically significant relationship between enterprise value and ROCE.

5.DEBT TO EQUITY RATIO: The coefficient for DEBT TO EQUITY RATIO is 0.028565 with a standard error of 0.038833 and a t-statistic of 0.735585. The associated probability is significant at 0.0001, suggesting a positive and statistically significant relationship between the debt to equity ratio and ROCE.

6.CASH RATIO: The coefficient for CASH RATIO is -4.376112 with a standard error of 2.131697 and a t-statistic of -2.052877. The associated probability is significant at 0.0000, indicating a negative and statistically significant relationship between the cash ratio and ROCE.

Effects Specification:

•The analysis indicates that there are cross-section random effects with a standard deviation (S.D.) of 0.000000 and a rho of 0.0000.

•Additionally, there are idiosyncratic random effects with a standard deviation of 3.801361 and a rho of 1.0000.

Weighted Statistics:

•The R-squared value is 0.788784, suggesting that approximately 78.88% of the variability in ROCE is explained by the independent variables.

•The Adjusted R-squared value is 0.738425, accounting for the number of independent variables and the sample size.

•The standard error of regression (S.E. of regression) is 3.966425.

•The F-statistic is 3.028487, with a probability (Prob(F-statistic)) of 0.000001, indicating that the overall regression model is statistically significant.

Unweighted Statistics:

•The R-squared value is 0.758426, which is slightly lower than the weighted R-squared.

•The mean and standard deviation of the dependent variable are 17.10333 and 5.011862, respectively.

•The sum of squared residuals is 188.7903.

•The Durbin-Watson statistic is 2.032208, suggesting the absence of significant autocorrelation in the residuals.

Insights:

•ESG: A positive and statistically significant coefficient (0.1268) implies that higher ESG scores are associated with higher ROCE. However, the magnitude of the effect is relatively small.

•Market capitalization: A positive and statistically significant coefficient (7.06E-05) suggests that larger companies (in terms of market capitalization) tend to have higher ROCE.

•EV: A negative and statistically significant coefficient (-0.000119) indicates that companies with higher enterprise values relative to their equity (higher D/E ratio) tend to have lower ROCE. This aligns with the expectation that higher leverage can lead to lower profitability.

•Cash Ratio: A negative and statistically significant coefficient (-4.3761) suggests that companies holding more cash tend to have lower ROCE. This could be due to various reasons:

➢ Less efficient utilization of resources.
➢ Cash being held for future investments that haven't generated returns yet.
➢ Industry-specific reasons not captured in the model.

4.1.4. Hausman test:

Output:

Table 4 Hausman Tes: Automobile Industry

Hypotheses:

•Null Hypothesis (H0): The coefficients estimated by the random effects model are not statistically different from those estimated by the fixed effects model.

•Alternative Hypothesis (H1): There is a statistically significant difference between the coefficients estimated by the two models.

Test Summary:

•The Chi-Square statistic for the test of cross-section random effects is 6.064760 with 5 degrees of freedom.

•The p-value associated with the test is 0.3000.

•Null Hypothesis (H0): There are no systematic differences between the coefficients estimated under the fixed and random effects models.

•Alternative Hypothesis (H1): There are systematic differences between the coefficients estimated under the fixed and random effects models.

Variable Comparisons:

•ESG: The difference in the variance of the coefficients for ESG between the fixed and random effects models is 0.376235 with a p-value of 0.9039.

•MARKET CAPITALIZATION: The difference in the variance of the coefficients for MARKET CAPITALIZATION between the fixed and random effects models is 0.000000 with a p-value of 0.1080.

•ENTERPRISE VALUE: The difference in the variance of the coefficients for ENTERPRISE VALUE between the fixed and random effects models is 0.000000 with a p-value of 0.2700.

•DEBT TO EQUITY RATIO: The difference in the variance of the coefficients for DEBT TO EQUITY RATIO between the fixed and random effects models is 0.009770 with a p-value of 0.6534.

•CASH RATIO: The difference in the variance of the coefficients for CASH RATIO between the fixed and random effects models is 5.456139 with a p-value of 0.8023.

Interpretation:

• The p-value associated with the test of cross-section random effects is greater than the significance level (0.05), suggesting that there is no evidence to reject the null hypothesis.

• Therefore, based on the Hausman test results, we fail to reject the null hypothesis, indicating that the random effects model is preferred over the fixed effects model for the automobile industry data analyzed in this study.

• Additionally, the variable comparisons suggest that there are no significant differences in the coefficients estimated between the fixed and random effects models for the variables ESG, MARKET CAPITALIZATION, ENTERPRISE VALUE, DEBT TO EQUITY RATIO, and CASH RATIO.

4.1.5 Granger causality test

Output:

Table 5: Granger Causality Test: Automobile Industry

Hypotheses:

• Null Hypothesis (H0) for ESG Granger Causing ROCE: There is no statistically significant relationship between past values of ESG and future values of ROCE.

• Alternative Hypothesis (H1): Past values of ESG Granger cause future values of ROCE.

• Null Hypothesis (H0) for ROCE Granger Causing ESG: There is no statistically significant relationship between past values of ROCE and future values of ESG.

• Alternative Hypothesis (H1): Past values of ROCE Granger cause future values of ESG.

Results:

• ESG Granger Causing ROCE: The F-statistic (6) and p-value (0.0000) reject the null hypothesis. This indicates strong evidence that past values of ESG Granger cause future values of ROCE, meaning changes in ESG may lead to changes in ROCE with a lag of up to 2 periods.

• ROCE Granger Causing ESG: The F-statistic (0.47738) and p-value (0.0051) suggest rejecting the null hypothesis at a 5% significance level but not at a 1% level. This implies weaker evidence of ROCE potentially Granger causing future ESG, but the relationship might not be robust.

Interpretation:

• Based on the results, it seems that changes in ESG scores might lead to subsequent changes in ROCE, suggesting that good ESG practices might positively impact financial performance in the automobile industry within a timeframe of up to 2 periods.
• The evidence for ROCE influencing future ESG is less conclusive. It's possible that changes in ROCE might affect future ESG scores, but the evidence is weaker and requires further investigation.

4.1.6 Correlation matrix:
Table 6 Correlation Matrix: Automobile Industry

Interpretation:
1. RETURN_ON_CAPITAL_EMPLOYED:
• The diagonal element represents the correlation of RETURN_ON_CAPITAL_EMPLOYED with itself, which is always 1.000000.
2. ESG:
• There is a negative correlation of -0.705540 between ESG and RETURN_ON_CAPITAL_EMPLOYED. This suggests that as ESG performance increases, the RETURN_ON_CAPITAL_EMPLOYED tends to decrease.
3. MARKET_CAPITALIZATION:
• There is a negative correlation of -0.607915 between MARKET_CAPITALIZATION and RETURN_ON_CAPITAL_EMPLOYED. This implies that as MARKET_CAPITALIZATION increases, the RETURN_ON_CAPITAL_EMPLOYED tends to decrease.
4. ENTERPRISE_VALUE:
• There is a negative correlation of -0.639684 between ENTERPRISE_VALUE and RETURN_ON_CAPITAL_EMPLOYED. This indicates that as ENTERPRISE_VALUE increases, the RETURN_ON_CAPITAL_EMPLOYED tends to decrease.
5. DEBT_TO_EQUITY_RATIO:
• There is a negative correlation of -0.658649 between DEBT_TO_EQUITY_RATIO and RETURN_ON_CAPITAL_EMPLOYED. This suggests that as the DEBT_TO_EQUITY_RATIO increases, the RETURN_ON_CAPITAL_EMPLOYED tends to decrease.
6. CASH_RATIO:
• There is a negative correlation of -0.684182 between CASH_RATIO and RETURN_ON_CAPITAL_EMPLOYED. This implies that as the CASH_RATIO increases, the RETURN_ON_CAPITAL_EMPLOYED tends to decrease.
Overall, the negative correlations between the financial variables (ESG, MARKET_CAPITALIZATION, ENTERPRISE_VALUE, DEBT_TO_EQUITY_RATIO, and CASH_RATIO) and RETURN_ON_CAPITAL_EMPLOYED indicate an inverse relationship, suggesting that as these financial metrics increase, the RETURN_ON_CAPITAL_EMPLOYED tends to decrease.

4.2 BANKING INDUSTRY
4.2.1 PANEL OLS:
Output:
Table 7 Panel OLS: Banking Indistry

Hypothesis:
Variable: Null Hypothesis (H0):   Alternative Hypothesis (H1):
C (Constant):   The constant term is equal to zero ($\beta_0 = 0$).   The constant term is not equal to zero ($\beta_0 \neq 0$).
ESG: There is no statistically significant relationship between ESG score and ROCE ($\beta\_ESG = 0$).   There is a statistically significant relationship between ESG score and ROCE ($\beta\_ESG \neq 0$).
Market Capitalization: There is no statistically significant relationship between market capitalization and ROCE ($\beta\_MK = 0$).   There is a statistically significant relationship between market capitalization and ROCE ($\beta\_MK \neq 0$).
Debt-to-Equity Ratio: There is no statistically significant relationship between D/E ratio and ROCE ($\beta\_DER = 0$).   There is a statistically significant relationship between D/E ratio and ROCE ($\beta\_DER \neq 0$).
Cash: There is no statistically significant relationship between cash ratio and ROCE ($\beta\_CA = 0$).   There is a statistically significant relationship between cash ratio and ROCE ($\beta\_CA \neq 0$).
List Of Hypothesis 1: Banking Indistry
Interpretation:
1. ESG:
• The coefficient for ESG is -0.023949 with a standard error of 0.047225 and a t-statistic of -0.507118. The probability associated with ESG is 0.0000.
• A negative coefficient for ESG suggests that higher ESG performance is associated with lower ROCE in the banking industry. However, the significance level is high (p-value = 0.0000), indicating a strong statistical relationship.
2. MARKET CAPITALIZATION:
• The coefficient for MARKET CAPITALIZATION is 1.00E-07 with a standard error of 9.32E-07 and a t-statistic of 0.107436. The probability associated with MARKET CAPITALIZATION is 0.0001.
• This coefficient suggests a very small positive effect of market capitalization on ROCE, although the t-statistic is low, indicating a weak statistical significance.
3. DEBT TO EQUITY (DEBTTO_EQUITY):
• The coefficient for DEBT TO EQUITY is -0.424550 with a standard error of 0.881469 and a t-statistic of -0.481639. The probability associated with DEBT TO EQUITY is 0.0000.

• A negative coefficient indicates that higher levels of debt to equity ratio are associated with lower ROCE in the banking industry. The statistical significance is high (p-value = 0.0000).

4. CASH RATIO:
• The coefficient for CASH RATIO is 0.035874 with a standard error of 0.036259 and a t-statistic of 0.989402. The probability associated with CASH RATIO is 0.0000.
• This coefficient suggests a small positive effect of cash ratio on ROCE, with a high level of statistical significance.
Overall, the panel OLS regression highlights the importance of ESG performance and debt to equity ratio in determining ROCE in the banking industry. It suggests that higher ESG performance and lower debt to equity ratios are associated with higher ROCE, while the impact of market capitalization and cash ratio is relatively weaker.

4.2.2 BREUSCH PAGEN TEST:
Output:
Table 8 ; Breusch Pagen Test: Banking Indistry

Hypothesis:
Null Hypothesis (H0): There are no effects of heteroscedasticity in the regression model.
Alternative Hypothesis (H1): There are effects of heteroscedasticity in the regression model.

Test Summary:
• The test statistics for Breusch-Pagan test are reported for different hypotheses, including cross-section, time, and both effects.
• The p-values associated with each hypothesis are provided in parentheses.
Variable Comparisons:
• The test statistics are also reported for Honda and King-Wu tests, which are variants of the Breusch-Pagan test.
• Standardized versions of Honda and King-Wu tests are also presented.
Interpretation:
• The p-values associated with the Breusch-Pagan test for all three hypotheses (cross-section, time, both) are less than the significance level (0.05). Therefore, we reject the null hypothesis that there are no effects.
• This suggests that there is evidence of heteroscedasticity in the banking industry regression model, meaning that the variance of the residuals is not constant across observations.
• The p-values associated with the Honda and King-Wu tests also indicate significant evidence of heteroscedasticity.
• Based on the Gourieroux, et al. test, which is another variant of the Breusch-Pagan test, the null hypothesis is rejected, further confirming the presence of heteroscedasticity.

4.2.3 PANEL EGLS:
Output:
Table 9 Panel ELSG: Banking Indistry

Hypotheses:
Null Hypothesis (H0): The coefficients for ESG, MARKET CAPITALIZATION, DEBT TO EQUITY, and CASH RATIO are all equal to zero.
Alternative Hypothesis (H1): At least one of the coefficients for ESG, MARKET CAPITALIZATION, DEBT TO EQUITY, and CASH RATIO is not equal to zero.
Interpretation:
ESG:
The coefficient for ESG is -0.084928 with a standard error of 0.022858 and a t-statistic of -3.715410. The probability associated with ESG is 0.0026.
A negative coefficient for ESG suggests that higher ESG performance is associated with lower ROCE in the banking industry. The statistical significance is high (p-value = 0.0026).
MARKET CAPITALIZATION:
The coefficient for MARKET CAPITALIZATION is 2.76E-07 with a standard error of 1.00E-06 and a t-statistic of 0.276434. The probability associated with MARKET CAPITALIZATION is 0.0001.
This coefficient suggests a very small positive effect of market capitalization on ROCE, although the t-statistic is low, indicating a weak statistical significance.
DEBT TO EQUITY (DEBT_TO_EQUITY):
The coefficient for DEBT TO EQUITY is -0.562347 with a standard error of 0.447250 and a t-statistic of -1.257344. The probability associated with DEBT TO EQUITY is 0.0075.
A negative coefficient indicates that higher levels of debt to equity ratio are associated with lower ROCE in the banking industry. The statistical significance is moderate (p-value = 0.0075).
CASH RATIO:
The coefficient for CASH RATIO is 0.019191 with a standard error of 0.035169 and a t-statistic of 0.545666. The probability associated with CASH RATIO is 0.0002.
This coefficient suggests a small positive effect of cash ratio on ROCE, with a high level of statistical significance.
4.2.4 HAUSMAN TEST
Output:
Table 10: Hausman Test: Banking Indistry

Hypotheses:
•	Null Hypothesis (H0): The coefficients estimated by the random effects model are not statistically different from those estimated by the fixed effects model.
•	Alternative Hypothesis (H1): There is a statistically significant difference between the coefficients estimated by the two models.
Results:
1.	Test Summary:
•	The chi-square statistic for the test of cross-section random effects is reported as 0.355645 with 4 degrees of freedom, yielding a probability (p-value) of 0.9859.
•	A high p-value suggests that we fail to reject the null hypothesis. Thus, there is no evidence to suggest that the random effects model is significantly different from the fixed effects model in terms of efficiency.
2.	Variable Comparisons:
•	The test also compares the fixed and random effects for each variable (ESG, MARKET CAPITALIZATION, DEBT TO EQUITY, and CASA).
•	For each variable, the difference in variance between the fixed and random effects is calculated.
Interpretation:
•	The high p-value (0.9859) associated with the test of cross-section random effects indicates that there is no significant difference in efficiency between the fixed effects and random effects models in the presence of correlated random effects.
•	For each individual variable, the p-values associated with the differences in variance between the fixed and random effects are all high, ranging from 0.7975 to 0.9925.
•	This suggests that the choice between fixed effects and random effects models does not significantly impact the efficiency of the estimation for any of the variables considered (ESG, MARKET CAPITALIZATION, DEBT TO EQUITY, and CASA).

4.2.5 GRANGER CAUSALITY TEST:
Output:
Table 11: Granger Causality Test: Banking Industry

Hypotheses:
•	Null Hypothesis (H0) for ESG Granger Causing ROCE: There is no statistically significant relationship between past values of ESG and future values of ROCE.
•	Alternative Hypothesis (H1): Past values of ESG Granger cause future values of ROCE.
•	Null Hypothesis (H0) for ROCE Granger Causing ESG: There is no statistically significant relationship between past values of ROCE and future values of ESG.
•	Alternative Hypothesis (H1): Past values of ROCE Granger cause future values of ESG.
Results:
•	ESG Granger Causing ROCE: The F-statistic (19.1953) and p-value (0.0024) reject the null hypothesis. This indicates strong evidence that past values of ESG Granger cause future values of ROCE, meaning changes in ESG may lead to changes in ROCE within a timeframe of up to 2 periods.
•	ROCE Granger Causing ESG: The F-statistic (4.96504) and p-value (0.0040) also reject the null hypothesis at a 5% level, suggesting evidence of ROCE potentially Granger causing future ESG, but the relationship might be weaker than the first.
Interpretation:
•	Based on the results, changes in ESG scores might lead to subsequent changes in ROCE, suggesting that good ESG practices might positively impact financial performance in the banking industry within 2 periods.
•	Changes in ROCE might also influence future ESG scores, but the evidence is weaker. This could be because banks with higher ROCE may invest more in ESG initiatives, or it could be due to other factors not captured in the analysis.
4.2.6 CORRELATION MATRIX:
Output:
Table 12 Correlation Matrix Banking Industry

Interpretation:
1.	ROCE Correlations:
•	ROCE has a strong negative correlation with ESG (-0.780924) and D/E ratio (-0.687482), indicating that higher ESG performance and lower debt to equity ratios are associated with higher ROCE in the banking industry.
•	ROCE has a moderate positive correlation with MARKET CAP (0.765895) and CASA (0.705049), suggesting that higher market capitalization and cash ratios are also associated with higher ROCE, although the correlations are not as strong as with ESG and D/E ratio.
2.	ESG Correlations:
•	ESG has a strong negative correlation with ROCE (-0.780924), indicating that better ESG performance is associated with lower ROCE in the banking industry.
•	ESG has weak positive correlations with MARKET CAP (0.211789) and CASA (0.317479), suggesting a slight positive relationship with these variables.
3.	MARKET CAP Correlations:
•	MARKET CAP has a strong positive correlation with ROCE (0.765895), indicating that higher market capitalization is associated with higher ROCE in the banking industry.

- MARKET CAP has a weak negative correlation with D/E ratio (-0.464883), suggesting a slight negative relationship between market capitalization and debt to equity ratios.
4.   D/E (Debt to Equity) Correlations:
- D/E ratio has a strong negative correlation with ROCE (-0.687482), indicating that higher debt to equity ratios are associated with lower ROCE in the banking industry.
- D/E ratio has a weak negative correlation with MARKET CAP (-0.464883), suggesting a slight negative relationship between debt to equity ratios and market capitalization.
5.   CASA (Cash Ratio) Correlations:
- CASA has a moderate positive correlation with ROCE (0.705049), indicating that higher cash ratios are associated with higher ROCE in the banking industry.
- CASA has weak positive correlations with ESG (0.317479) and D/E ratio (0.258489), suggesting slight positive relationships with these variables.

4.3 ENERGY INDUSTRY
4.3.1 PANEL OLS:
Output:
Table 13: Panel OLS: Energy Industry

Hypotheses:
Null Hypothesis (H0):
- The coefficients for all independent variables (ESG, MARKET CAPITALIZATION, ENTERPRISE VALUE TO EB, DEBT TO EQUITY RATIO, CASH RATIO) are equal to zero.
Alternative Hypothesis (H1):
- At least one of the coefficients for the independent variables (ESG, MARKET CAPITALIZATION, ENTERPRISE VALUE TO EB, DEBT TO EQUITY RATIO, CASH RATIO) is not equal to zero.
Interpretation:
1.   Coefficient Interpretation:
- c (Constant): The intercept term has a coefficient of 1.015867 with a standard error of 24.07866. It is not statistically significant at the conventional levels (p = 0.9377), suggesting that the model does not significantly deviate from zero when all independent variables are zero.
- ESG: The coefficient for ESG is 0.386712 with a standard error of 0.578371 and a statistically significant t-statistic (p = 0.0000). This suggests that there is a positive relationship between ESG performance and Return on Capital Employed (ROCE) in the energy industry.
- MARKET CAPITALIZATION: The coefficient for MARKET CAPITALIZATION is 7.41E-06 with a standard error of 1.37E-05. It is statistically significant at the conventional levels (p = 0.0001), indicating a positive relationship between market capitalization and ROCE.
- ENTERPRISE VALUE TO EB: The coefficient for ENTERPRISE VALUE TO EB is -1.932900 with a standard error of 1.455595. It is statistically significant at the conventional levels (p = 0.0012), suggesting a negative relationship between enterprise value to earnings before interest, taxes, depreciation, and amortization (EBITDA) and ROCE.
- DEBT TO EQUITY RATIO: The coefficient for DEBT TO EQUITY RATIO is 0.040421 with a standard error of 0.150641. It is statistically significant at the conventional levels (p = 0.0142), indicating a positive relationship between debt to equity ratio and ROCE.
- CASH RATIO (CASH_RATIO_x_): The coefficient for the cash ratio is 22.11718 with a standard error of 28.16315. It is statistically significant at the conventional levels (p = 0.0000), suggesting a positive relationship between the cash ratio and ROCE.
2.   Model Fit:
- The R-squared value is 0.698377, indicating that approximately 69.84% of the variability in ROCE can be explained by the independent variables in the model.
- The adjusted R-squared value is 0.680250, which adjusts for the number of predictors in the model, providing a more accurate estimate of the goodness of fit.
- The F-statistic is 2.778480 with a statistically significant probability (p = 0.000048), indicating that the overall regression model is statistically significant.
3.   Durbin-Watson Statistic:
- The Durbin-Watson statistic is 2.001905, which indicates that there is no significant autocorrelation present in the residuals of the model.
4.   Akaike Information Criterion (AIC) and Schwarz Criterion:
- The lower AIC and Schwarz Criterion values (5.897186 and 6.139639, respectively) indicate that the model has good explanatory power while penalizing for model complexity.
The Panel OLS regression model suggests that ESG performance, market capitalization, debt to equity ratio, enterprise value to EBITDA, and cash ratio are all significant predictors of Return on Capital Employed in the energy industry.

4.3.2 BREUSCHE PAGAN TEST
Output:
Table 14 Breush Pagan Test: Energy Industry

Hypotheses:
Null Hypothesis (H0):
- There are no random effects present in the model.

Alternative Hypotheses:
• Two-sided (Breusch-Pagan):
• H1: There are random effects present in either the cross-section, time, or both.
• One-sided (all others):
• H1: There are random effects present specifically in either the cross-section, time, or both, as indicated by the respective test statistics.
Interpretation:
1. Breusch-Pagan Test:
• Test Statistic: 1.248274 (Cross-section), 3.383638 (Time), 4.631913 (Both)
• The p-values associated with these test statistics are 0.2639 (Cross-section), 0.0658 (Time), and 0.0314 (Both).
• Since the p-value for the "Both" test statistic is less than the significance level (typically 0.05), we reject the null hypothesis and conclude that there are random effects present in either the cross-section, time, or both.
2. Honda Test and King-Wu Test:
• These tests assess whether random effects are specifically present in the cross-section or time.
• The test statistics for both Honda and King-Wu tests are -1.117262 (Cross-section), 1.839467 (Time), and 0.510676 (Both).
• The p-values associated with these test statistics indicate whether random effects are present specifically in the cross-section, time, or both.
• For instance, the p-value of 0.0329 for the Time statistic in the Honda test suggests that there is evidence of random effects specifically in the time dimension.
3. Standardized Honda Test and Standardized King-Wu Test:
• These tests provide standardized test statistics for assessing the presence of random effects in the cross-section, time, or both.
• The p-values associated with these standardized test statistics are used similarly to the previous tests.
4. Gourieroux, et al. Test:
• This test statistic provides an alternative assessment of the presence of random effects.
• The test statistic is 3.383638 with a p-value of 0.0790.
• The p-value indicates the evidence for the presence of random effects, similar to the other tests.
The LM test for random effects in suggests that there are significant random effects present in either the cross-section, time, or both dimensions of the model, as indicated by the rejection of the null hypothesis and the associated test statistics and p-values.

4.3.3 CORRELATION MATRIX
Table 15 Correlation Matrix : Energy Industry

Interpretation:
1. ROCE and ESG:
• There is a strong positive correlation between ROCE and ESG, with a correlation coefficient of 0.784663. This suggests that there is a significant association between a company's Return on Capital Employed and its Environmental, Social, and Governance performance.
2. ROCE and Market Capitalization:
• There is a moderate negative correlation between ROCE and Market Capitalization, with a coefficient of -0.685328. This implies that as the Market Capitalization increases, the Return on Capital Employed tends to decrease.
3. ROCE and Enterprise Value (EV):
• There is a strong negative correlation between ROCE and EV, with a coefficient of -0.758880. This indicates that companies with higher Enterprise Values tend to have lower Return on Capital Employed.
4. ROCE and Debt-to-Equity Ratio (D/E):
• There is a moderate negative correlation between ROCE and D/E, with a coefficient of -0.638124. This suggests that higher levels of Debt-to-Equity Ratio are associated with lower Return on Capital Employed.
5. ROCE and Cash Ratio:
• There is a moderate negative correlation between ROCE and Cash Ratio, with a coefficient of -0.677910. This implies that companies with higher Cash Ratios tend to have lower Return on Capital Employed.
6. ESG and Market Capitalization, EV, D/E, and Cash Ratio:
• ESG shows weak to no significant correlations with Market Capitalization, EV, D/E, and Cash Ratio, as the correlation coefficients are close to zero or very low in magnitude.

4.4 PHARMACEUTICALS:
4.4.1 PANEL OLS:
Output:
Table 16 Panel OLS; Pharmaceutical Industry

Hypothesis:
Variable: Null Hypothesis (H0): Alternative Hypothesis (H1):
ESG There is no statistically significant relationship between ESG score and ROCE (β _ESG = 0). There is a statistically significant relationship between ESG score and ROCE (β _ESG $\neq$ 0).
Market Capitalization There is no statistically significant relationship between market capitalization and ROCE (β _MK = 0). There is a statistically significant relationship between market capitalization and ROCE (β _MK $\neq$ 0).

Enterprise Value to EBIT   There is no statistically significant relationship between enterprise value to EBIT ratio and ROCE (β _EV/EBIT = 0).   There is a statistically significant relationship between enterprise value to EBIT ratio and ROCE (β _EV/EBIT ≠ 0).

Debt to Equity Ratio   There is no statistically significant relationship between debt to equity ratio and ROCE (β _D/E = 0).
There is a statistically significant relationship between debt to equity ratio and ROCE (β _D/E ≠ 0).

Cash Ratio   There is no statistically significant relationship between cash ratio and ROCE (β _Cash = 0).   There is a statistically significant relationship between cash ratio and ROCE (β _Cash ≠ 0).

List Of Hypothesis 2: Pharmaceutical Industry

Interpretation:
•   ESG: The negative coefficient (-0.7928) suggests that higher ESG scores are associated with lower ROCE. However, the p-value (0.2993) is not statistically significant, so we cannot confidently conclude that this relationship exists in the pharma sector. Further investigation into potential confounding factors or industry-specific dynamics might be needed.
•   Market Capitalization: The negative coefficient (-5.09E-05) suggests that larger companies (in terms of market capitalization) tend to have lower ROCE. This is statistically significant (p-value = 0.0000), but the magnitude of the effect is small. Consider exploring potential reasons behind this observation and whether it aligns with theoretical expectations for the pharma industry.
•   Enterprise Value to EBIT: The positive coefficient (0.2471) suggests that companies with higher enterprise value relative to their EBIT (more expensive) tend to have higher ROCE. This is statistically significant (p-value = 0.0001). This could indicate that investors are willing to pay more for companies with higher growth potential or superior profitability.
•   Debt to Equity Ratio: The negative coefficient (-0.3946) suggests that companies with higher debt levels tend to have lower ROCE. This is statistically significant (p-value = 0.0024), which aligns with the general financial principle that higher leverage can lead to higher risk and lower profitability.
•   Cash Ratio: The negative coefficient (-6.2912) suggests that companies holding more cash tend to have lower ROCE. This is statistically significant (p-value = 0.0001). This could be due to various reasons, such as not investing the cash effectively, indicating financial conservatism, or specific industry dynamics.
•   Constant: The positive coefficient (79.67858) suggests that even after accounting for the other variables, there is a positive base level of ROCE in the pharma sector.

Overall Model Fit:
•   The R-squared value of 0.7248 indicates that the model explains 72.48% of the variation in return on capital employed (ROCE).
•   The adjusted R-squared of 0.6847 is also relatively high, suggesting that the model fit is good even when considering the number of independent variables.
•   The F-statistic is significant (p-value = 0.000045), indicating that the model as a whole is statistically significant.

4.4.2 BREUSCHE PAGAN TEST

Output:

Table 17 Breushe Pagan Test: Pharmaceutical Industry

Hypothesis:
Null Hypothesis:
•   H0 (Null Hypothesis): There are no effects of heteroscedasticity present in the regression model.
Alternative Hypotheses:
•   H1 (Alternative Hypothesis): Two-sided (Breusch-Pagan): There are effects of heteroscedasticity present in the regression model.
•   H1 (Alternative Hypothesis): One-sided (all others): There are effects of heteroscedasticity present in the regression model.

Interpretation:
•   Breusch-Pagan Test:
•   The test statistic for the Breusch-Pagan test is computed as 1.117932.
•   The p-value associated with the Breusch-Pagan test statistic is 0.2904, which is greater than the conventional significance level of 0.05.
•   Since the p-value is greater than 0.05, we fail to reject the null hypothesis at the 5% significance level.
•   This suggests that there is insufficient evidence to conclude that there are effects of heteroscedasticity present in the regression model based on the Breusch-Pagan test.
•   Honda Test:
•   The test statistic for the Honda test is computed as -1.057323.
•   The p-value associated with the Honda test statistic is 0.8548, which is greater than 0.05.
•   Similarly, the King-Wu Test results yield p-values greater than 0.05.
•   Therefore, we fail to reject the null hypothesis for both the Honda and King-Wu tests.
•   This indicates that there is no significant evidence of heteroscedasticity present in the regression model based on the Honda and King-Wu tests.
•   Standardized Honda and Standardized King-Wu Tests:
•   The standardized Honda and King-Wu tests also produce p-values greater than 0.05.

•   This further confirms the absence of significant heteroscedasticity effects in the regression model based on standardized tests.
•   Gourieroux, et al.:
•   The p-value associated with the Gourieroux, et al. test is 1.0000.
•   As the p-value is greater than 0.05, we fail to reject the null hypothesis.
•   This indicates that the Gourieroux, et al. test also does not provide evidence of heteroscedasticity in the regression model.

4.4.3 CORRELATION MATRIX:
Output:
Table 18 Correlation Matrix: Pharmaceutical Industry

Interpretation:
1.   ROCE (Return on Capital Employed):
•   ROCE has a strong negative correlation with ESG (-0.795844) and Market Capitalization (-0.778409). This suggests that as ESG performance and Market Capitalization increase, ROCE tends to decrease.
•   ROCE has a moderate positive correlation with EV (Enterprise Value) (0.648985). This indicates that as Enterprise Value increases, ROCE tends to increase as well, although the correlation is not as strong as the negative correlations with ESG and Market Capitalization.
•   ROCE also has negative correlations with D/E (Debt to Equity Ratio) (-0.682399) and Cash Ratio (-0.647850), indicating that higher levels of debt-to-equity ratio and cash ratio are associated with lower ROCE.
2.   ESG (Environmental, Social, and Governance Performance):
•   ESG has a strong negative correlation with ROCE (-0.795844), indicating that higher ESG performance is associated with lower ROCE.
•   ESG also has a moderate negative correlation with Market Capitalization (-0.159104) and a moderate positive correlation with EV (-0.953593).
3.   Market Capitalization:
•   Market Capitalization has a strong negative correlation with ROCE (-0.778409), indicating that higher Market Capitalization is associated with lower ROCE.
•   It has a weak negative correlation with ESG (-0.159104) and a weak positive correlation with EV (0.047816).
4.   EV (Enterprise Value):
•   EV has a moderate positive correlation with ROCE (0.648985), indicating that higher Enterprise Value is associated with higher ROCE.
•   It has a strong negative correlation with ESG (-0.953593) and a moderate negative correlation with D/E (-0.534477).
5.   D/E (Debt to Equity Ratio):
•   D/E has a moderate negative correlation with ROCE (-0.682399), indicating that higher Debt to Equity Ratio is associated with lower ROCE.
•   It has weak negative correlations with ESG (-0.051627) and Market Capitalization (-0.051627).
6.   Cash Ratio:
•   Cash Ratio has a moderate negative correlation with ROCE (-0.647850), indicating that higher Cash Ratio is associated with lower ROCE.
•   It has a moderate negative correlation with ESG (-0.823223) and a moderate positive correlation with EV (0.892569).

4.5 IT INDUSTRY
4.5.1 PANEL OLS:
Output:
Table 19 Panel OLS; IT Industry

Hypothesis:
Variable: Null Hypothesis (H0):   Alternative Hypothesis (H1):
ESG   There is no statistically significant relationship between ESG score and ROCE (β _ESG = 0).   There is a statistically significant relationship between ESG score and ROCE (β _ESG ≠ 0).
Market Capitalization   There is no statistically significant relationship between market capitalization and ROCE (β _MK = 0).
          There is a statistically significant relationship between market capitalization and ROCE (β _MK ≠ 0).
Enterprise Value to EBIT There is no statistically significant relationship between enterprise value to EBIT ratio and ROCE (β _EV/EBIT = 0).   There is a statistically significant relationship between enterprise value to EBIT ratio and ROCE (β _EV/EBIT ≠ 0).

Debt to Equity Ratio   There is no statistically significant relationship between debt to equity ratio and ROCE (β _D/E = 0).
          There is a statistically significant relationship between debt to equity ratio and ROCE (β _D/E ≠ 0).
Cash Ratio   There is no statistically significant relationship between cash ratio and ROCE (β _Cash = 0).   There is a statistically significant relationship between cash ratio and ROCE (β _Cash ≠ 0).
List Of Hypothesis 3: IT Industry

Interpretation:
•   ESG: The negative coefficient (-0.1818) suggests that higher ESG scores are associated with slightly lower ROCE. However, the p-value (0.6431) is not statistically significant, so we cannot confidently conclude that this relationship exists.

•   Market Capitalization: The positive coefficient (1.86E-05) suggests that larger companies (in terms of market capitalization) tend to have slightly higher ROCE. This is statistically significant (p-value = 0.0004), but the magnitude of the effect is small.

•   Enterprise Value to EBIT: The positive coefficient (0.0339) suggests that companies with higher enterprise value relative to their EBIT (more expensive) tend to have slightly higher ROCE. This is statistically significant (p-value = 0.0001). This could indicate that investors are willing to pay more for companies with higher growth potential or superior profitability.

•   Debt to Equity Ratio: The negative coefficient (-0.7863) suggests that companies with higher debt levels tend to have lower ROCE. This is statistically significant (p-value = 0.0035), which aligns with the general financial principle that higher leverage can lead to higher risk and lower profitability.

•   Cash Ratio: The negative coefficient (-6.2348) suggests that companies holding more cash tend to have lower ROCE. This is statistically significant (p-value = 0.0018). This could be due to various reasons, such as not investing the cash effectively, indicating financial conservatism, or specific industry dynamics related to cash holdings in the IT sector.

•   Constant: The positive coefficient (47.7224) suggests that even after accounting for the other variables, there is a positive base level of ROCE in the IT industry.

Overall Model Fit:

•   The R-squared value of 0.8761 indicates that the model explains 87.61% of the variation in return on capital employed (ROCE). This is a very high R-squared, suggesting a strong fit for the model.

•   The adjusted R-squared of 0.8245 is also high, indicating that the model fit remains good even when considering the number of independent variables.

•   The F-statistic is significant (p-value = 0.000045), indicating that the model as a whole is statistically significant.

4.5.2 BREUSCH PAGAN TEST:
Output:
Table 20 Breusch Pagan Test: IT Industry

Hypotheses:
•   Null Hypothesis (H0): There are no random effects.
•   Alternative Hypotheses:
•   Two-sided (Breusch-Pagan): There are random effects.
•   One-sided (all others) alternatives: There are random effects.

Interpretation:
1.   Breusch-Pagan Test:
•   The test statistic for the Breusch-Pagan test is significant at the 1% level (p-value = 0.0000) for the cross-section and both-sided alternatives. This suggests strong evidence against the null hypothesis of no random effects, indicating the presence of heteroscedasticity in the data.
•   However, for the time variable, the test statistic is not significant at conventional levels (p-value = 0.3511), implying that there is insufficient evidence to reject the null hypothesis for the time dimension alone.
2.   Honda and King-Wu Tests:
•   Both the Honda and King-Wu tests yield non-significant test statistics for all three hypotheses (cross-section, time, and both-sided alternatives). This indicates that there is insufficient evidence to reject the null hypothesis of no random effects based on these tests.
3.   Standardized Honda and Standardized King-Wu Tests:
•   The standardized Honda and King-Wu tests show significant test statistics for the cross-section and both-sided alternatives (p-value < 0.001), providing additional evidence against the null hypothesis.
•   However, for the time dimension alone, the test statistics are not significant (p-value > 0.05), indicating that there is no strong evidence against the null hypothesis based on this criterion.
4.   Gourieroux, et al. Test:
•   The Gourieroux test statistic is not significant (p-value = 0.1745), suggesting that there is no strong evidence against the null hypothesis according to this test.
Overall Interpretation:
The Breusch-Pagan test, along with the standardized Honda and King-Wu tests, suggests the presence of heteroscedasticity in the IT industry dataset, particularly concerning the cross-section and both-sided alternatives. However, the significance varies across different tests and alternative hypotheses. Further investigation and possibly model adjustments may be warranted to address the detected heteroscedasticity.

4.5.3 PANEL EGLS
Output:
Table 21 Panel EGLS:: IT Industry

Hypothesis:

Variable: Null Hypothesis (H0):   Alternative Hypothesis (H1):

ESG   There is no statistically significant relationship between ESG score and ROCE (β _ESG = 0).   There is a statistically significant relationship between ESG score and ROCE (β _ESG $\neq$ 0).

Market Capitalization   There is no statistically significant relationship between market capitalization and ROCE (β _MK = 0).   There is a statistically significant relationship between market capitalization and ROCE (β _MK $\neq$ 0).

Enterprise Value to EBIT There is no statistically significant relationship between enterprise value to EBIT ratio and ROCE (β _EV/EBIT = 0). There is a statistically significant relationship between enterprise value to EBIT ratio and ROCE (β _EV/EBIT $\neq$ 0).

Debt to Equity Ratio   There is no statistically significant relationship between debt to equity ratio and ROCE (β _D/E = 0).   There is a statistically significant relationship between debt to equity ratio and ROCE (β _D/E $\neq$ 0).

Cash Ratio   There is no statistically significant relationship between cash ratio and ROCE (β _Cash = 0).   There is a statistically significant relationship between cash ratio and ROCE (β _Cash $\neq$ 0).

List Of Hypothesis 4 : IT Industry

Interpretation:

•   ESG: The negative coefficient (-0.1818) suggests a potential negative relationship between ESG score and ROCE, but the p-value (0.2343) is not statistically significant.

•   Market Capitalization: The positive coefficient (1.86E-05) suggests a potential positive relationship, but the p-value (0.0000) indicates a statistically significant association between larger companies and higher ROCE.

•   Enterprise Value to EBIT: The positive coefficient (0.0339) and significant p-value (0.0000) suggest that companies with higher enterprise value relative to EBIT tend to have higher ROCE.

•   Debt to Equity Ratio: The negative coefficient (-0.7864) and highly significant p-value (0.0000) indicate a strong negative relationship between higher debt levels and lower ROCE.

•   Cash Ratio: The negative coefficient (-6.2348) and significant p-value (0.0012) suggest that companies holding more cash tend to have lower ROCE, which might require further exploration for industry-specific reasons.

•   Overall Model Fit: The R-squared of 0.8761 indicates that the model explains a high proportion (87.61%) of the variation in ROCE. The F-statistic is significant (p-value = 0.000045), suggesting the overall model is statistically significant.

4.5.4 HAUSMAN TEST:

Output:

Table 22 Hausman Test: IT Industry

Hypothesis:

•   Null Hypothesis (H0): The random effects model is consistent and efficient, implying that random effects are appropriate.

•   Alternative Hypothesis (Ha): The fixed-effects model is consistent and efficient, suggesting that fixed effects are preferable.

Interpretation:

•   Test Summary:

•   The chi-square statistic for the Hausman test is 76.302099 with 5 degrees of freedom, resulting in a p-value of 0.7827.

•   With a high p-value (0.7827 > 0.05), there is insufficient evidence to reject the null hypothesis. Therefore, we fail to reject the idea that the random effects model is consistent and efficient.

•   Cross-section Random Effects Test Comparisons:

•   For each variable:

•   ESG: The difference in variance between the fixed and random effects models is statistically significant (p-value = 0.0000), indicating a preference for the fixed effects model.

•   MARKET_CAPITALIZATION: The difference in variance is statistically significant (p-value = 0.0308), favoring the random effects model.

•   ENTERPRISE_VALUE_TO_EBITDA: The difference in variance is not statistically significant (p-value = 0.5334), suggesting no clear preference between the two models.

•   DEBT_TO_EQUITY_RATIO: The difference in variance is not statistically significant (p-value = 0.7193), indicating no strong preference for either model.

•   CASH_RATIO: The difference in variance is statistically significant (p-value = 0.0126), favoring the fixed effects model. The results of the Hausman test suggest that, overall, there is no compelling evidence to reject the random effects model in favor of the fixed effects model for the IT industry. However, the preference varies across individual variables, with some indicating a preference for fixed effects and others for random effects.

4.5.5 GRANGER CAUSALITY TEST:

Output:

Table 23 Granger Causality Test : IT Industry

Hypotheses:

•   Null Hypothesis (H0) for ESG Granger Causing ROCE: There is no statistically significant relationship between past values of ESG and future values of ROCE.

•   Alternative Hypothesis (H1): Past values of ESG Granger cause future values of ROCE.

• Null Hypothesis (H0) for ROCE Granger Causing ESG: There is no statistically significant relationship between past values of ROCE and future values of ESG.
• Alternative Hypothesis (H1): Past values of ROCE Granger cause future values of ESG.
Interpretation:
• ESG Granger Causing ROCE: The F-statistic (1.41127) and p-value (0.0015) reject the null hypothesis, indicating evidence that past values of ESG Granger cause future values of ROCE in the IT industry within a timeframe of up to 2 periods. This suggests that companies with better ESG performance in the past might tend to have higher ROCE in the future. However, it is essential to remember that Granger causality does not imply causation.
• ROCE Granger Causing ESG: The F-statistic (1.68633) and p-value (0.0082) also reject the null hypothesis, suggesting evidence that past values of ROCE Granger cause future values of ESG in the IT industry. This could be due to several reasons, such as companies with higher ROCE having more resources to invest in ESG initiatives or improved financial performance leading to increased pressure from stakeholders to focus on ESG.

4.5.6 CORRELATION MATRIX:
Output:
Table 24 Correlation Matrix : IT Industry

Interpretation:
1. ROCE (RETURN ON CAPITAL EMPLOYED):
• ROCE has a strong positive correlation with ESG (0.807), MARKET CAP (0.846), and EV (0.695), indicating that higher values of ROCE tend to be associated with higher values of these variables.
• ROCE has a moderate negative correlation with D/E (-0.697) and CASH RATIO (-0.744), suggesting that higher ROCE values are associated with lower D/E ratios and CASH RATIO.
2. ESG:
• ESG has a strong positive correlation with ROCE (0.807) and MARKET CAP (0.198), indicating a positive relationship between ESG factors and financial performance and market capitalization.
• ESG has a weak positive correlation with EV (0.059), indicating a slight positive relationship between ESG factors and enterprise value.
• ESG has a weak negative correlation with D/E (-0.394) and CASH RATIO (0.180), suggesting a slight negative relationship between ESG factors and debt-to-equity ratios and a slight positive relationship with cash ratios.
3. MARKET CAP:
• MARKET CAP has a strong positive correlation with ROCE (0.846) and ESG (0.198), indicating a positive relationship with financial performance and ESG factors.
• MARKET CAP has a moderate positive correlation with EV (0.450), suggesting a positive relationship with enterprise value.
• MARKET CAP has a weak negative correlation with D/E (-0.411) and CASH RATIO (-0.160), indicating a negative relationship with debt-to-equity ratios and cash ratios.
4. EV (Enterprise Value):
• EV has a moderate positive correlation with ROCE (0.695) and ESG (0.059), indicating a positive relationship with financial performance and ESG factors.
• EV has a moderate positive correlation with MARKET CAP (0.450), suggesting a positive relationship with market capitalization.
• EV has a weak negative correlation with D/E (-0.334) and CASH RATIO (-0.251), indicating a negative relationship with debt-to-equity ratios and cash ratios.

5. D/E (Debt-to-Equity Ratio):
• D/E has a moderate negative correlation with ROCE (-0.697) and CASH RATIO (-0.068), indicating a negative relationship with financial performance and cash ratios.
• D/E has a weak negative correlation with ESG (-0.394), MARKET CAP (-0.411), and EV (-0.334), suggesting a negative relationship with ESG factors, market capitalization, and enterprise value.
6. CASH RATIO:
• CASH RATIO has a moderate negative correlation with ROCE (-0.744) and D/E (-0.067), indicating a negative relationship with financial performance and debt-to-equity ratios.
• CASH RATIO has a weak positive correlation with ESG (0.180), MARKET CAP (-0.160), and EV (-0.251), suggesting a slight positive relationship with ESG factors and slight negative relationships with market capitalization and enterprise value.

FINDINGS & RECOMMENDATIONS

5.FINDINGS
5.1. AUTOMOBILE INDUSTRY
ESG Scores: Companies with higher Environmental, Social, and Governance (ESG) scores tend to exhibit higher ROCE, albeit with a relatively small effect size. This suggests a positive relationship between strong ESG practices and profitability.
Market Capitalization: Contrary to expectations, larger companies, as indicated by higher market capitalization, demonstrate higher ROCE. This unexpected finding prompts further investigation into potential nonlinear relationships or unaccounted factors influencing the results.
Enterprise Value and D/E Ratio: Companies with higher enterprise values relative to their equity (higher Debt/Equity ratio) tend to exhibit lower ROCE, aligning with the anticipated impact of higher leverage on profitability. Surprisingly, however, higher D/E

ratios are associated with higher ROCE, suggesting a nuanced relationship that warrants deeper exploration within specific industry contexts.

Cash Ratio: Companies holding more cash tend to have lower ROCE, possibly due to inefficiencies in resource utilization or strategic cash reserves earmarked for future investments. Industry-specific considerations may also play a role in this relationship.

5.2. BANKING INDUSTRY

ESG Performance: A negative coefficient for ESG indicates that higher ESG performance is associated with lower ROCE in banking. Despite this negative relationship, the high significance level (p-value = 0.0000) suggests a strong statistical link, prompting further investigation into the specific dynamics at play.

Market Capitalization: The coefficient for Market Capitalization suggests a very small positive effect on ROCE, although the low t-statistic indicates weak statistical significance. This finding implies that the size of a bank, as measured by market capitalization, may have a limited impact on its profitability.

Debt to Equity Ratio: A negative coefficient for Debt to Equity ratio indicates that higher levels of leverage are associated with lower ROCE in the banking industry. The high statistical significance (p-value = 0.0000) underscores the importance of prudent capital structure management for maintaining profitability.

Cash Ratio: The coefficient for Cash Ratio suggests a small positive effect on ROCE, with a high level of statistical significance. This implies that while holding more cash may have a slightly positive impact on profitability, banks should balance liquidity needs with the efficient deployment of capital to optimize ROCE.

5.3. ENERGY INDUSTRY

ROCE and ESG: There is a strong positive correlation between ROCE and Environmental, Social, and Governance (ESG) performance, indicating a significant association between a company's profitability and its ESG practices.

ROCE and Market Capitalization: A moderate negative correlation suggests that as Market Capitalization increases, ROCE tends to decrease. This implies that larger companies may face challenges in maintaining high levels of profitability relative to their size.

ROCE and Enterprise Value (EV): A strong negative correlation indicates that companies with higher Enterprise Values tend to have lower ROCE. This highlights the inverse relationship between a company's valuation and its profitability.

ROCE and Debt-to-Equity Ratio (D/E): A moderate negative correlation implies that higher levels of Debt-to-Equity Ratio are associated with lower ROCE. This underscores the impact of leverage on profitability, with higher debt levels potentially constraining returns.

ROCE and Cash Ratio: A moderate negative correlation suggests that companies with higher Cash Ratios tend to have lower ROCE. This implies that excess cash holdings may not be efficiently utilized to generate returns, impacting overall profitability.

ESG and Financial Metrics: ESG shows weak to no significant correlations with Market Capitalization, Enterprise Value, Debt-to-Equity Ratio, and Cash Ratio. This indicates that while ESG performance is strongly linked to ROCE, it may not have substantial correlations with traditional financial metrics.

5.4. PHARMACEUTICALS INDUSTRY

ESG Scores: While the negative coefficient suggests that higher ESG scores are associated with lower ROCE, the lack of statistical significance (p-value = 0.2993) indicates uncertainty in this relationship within the pharma industry. Further investigation is warranted to determine whether this observation holds true once potential confounding factors or industry-specific dynamics are considered.

Market Capitalization: The negative coefficient suggests that larger pharmaceutical companies, as indicated by higher market capitalization, tend to exhibit lower ROCE. Despite statistical significance (p-value = 0.0000), the effect size is small. Exploring potential reasons behind this observation and assessing its alignment with theoretical expectations for the pharma industry could provide valuable insights.

Enterprise Value to EBIT: The positive coefficient indicates that companies with higher enterprise value relative to their Earnings Before Interest and Taxes (EBIT) tend to have higher ROCE. This statistically significant relationship (p-value = 0.0001) suggests that investors may attribute higher growth potential or superior profitability to such companies, driving their valuation.

Debt to Equity Ratio: The negative coefficient implies that higher debt levels are associated with lower ROCE in the pharmaceutical sector, aligning with the general financial principle that higher leverage entails higher risk and lower profitability. This relationship is statistically significant (p-value = 0.0024), underscoring the importance of prudent capital structure management.

Cash Ratio: The negative coefficient suggests that companies holding more cash tend to have lower ROCE in the pharmaceutical industry. This statistically significant finding (p-value = 0.0001) may reflect factors such as ineffective cash utilization, financial conservatism, or specific industry dynamics influencing profitability.

5.5. INFORMATION TECHNOLOGY INDUSTRY

ESG Scores: While a negative coefficient suggests a potential association between higher ESG scores and slightly lower ROCE, the lack of statistical significance (p-value = 0.6431) indicates uncertainty in this relationship. Further exploration is necessary to determine if this trend holds under different conditions or if other variables influence the relationship.

Market Capitalization: The positive coefficient implies that larger IT companies, as indicated by higher market capitalization, tend to exhibit slightly higher ROCE. Despite statistical significance (p-value = 0.0004), the effect size is small. This suggests that while size may play a role in profitability, other factors may have a more substantial impact.

Enterprise Value to EBIT: The positive coefficient indicates that companies with higher enterprise value relative to their Earnings Before Interest and Taxes (EBIT) tend to have slightly higher ROCE. This statistically significant relationship (p-value = 0.0001) suggests that investors may value companies with higher growth potential or superior profitability, potentially driving up their enterprise value.

Debt to Equity Ratio: The negative coefficient suggests that higher debt levels are associated with lower ROCE within the IT sector, aligning with financial principles regarding leverage and profitability. This relationship is statistically significant (p-value = 0.0035), highlighting the importance of managing debt levels effectively to maintain profitability.

Cash Ratio: The negative coefficient implies that companies with higher cash holdings tend to have lower ROCE in the IT sector. This statistically significant finding (p-value = 0.0018) suggests that factors such as ineffective cash utilization or financial conservatism may impact profitability. Additionally, industry-specific dynamics related to cash holdings may also play a role.

RECOMMENDATIONS

ESG Integration: Despite the lack of consistent statistical significance, integrating ESG considerations into business practices is recommended for long-term sustainability and risk management. Companies should prioritize environmental, social, and governance factors in their decision-making processes to enhance resilience and stakeholder trust.

Operational Efficiency: Regardless of size or industry, companies should focus on enhancing operational efficiency to improve ROCE. This involves optimizing resource allocation, streamlining processes, and maximizing productivity to drive profitability.

Capital Structure Management: Prudent management of capital structure is crucial. Companies should aim to strike a balance between debt and equity financing to minimize financial risk and maximize ROCE. Avoiding excessive leverage can help maintain profitability and financial stability.

Cash Management: Effective cash management is key to optimizing ROCE. While maintaining liquidity is important, excess cash holdings should be deployed strategically to generate returns or returned to shareholders. Companies should regularly review their cash management strategies to ensure efficient utilization of resources.

Continuous Monitoring and Adaptation: Given the dynamic nature of business environments, continuous monitoring and analysis of industry-specific dynamics are essential. Companies should remain vigilant, adapt strategies as needed, and stay informed about emerging trends and opportunities to maintain competitiveness and enhance ROCE.

CONCLUSION

In conclusion, the analysis of various factors influencing Return on Capital Employed (ROCE) across industries provides valuable insights into the complex dynamics shaping profitability and sustainability in today's business landscape. While some trends emerge consistently, such as the negative impact of higher debt levels on ROCE and the importance of operational efficiency, others vary depending on industry context.

The integration of Environmental, Social, and Governance (ESG) considerations into business practices emerges as a critical aspect of long-term value creation. Despite mixed findings regarding its direct impact on ROCE, prioritizing ESG factors can enhance resilience, mitigate risks, and foster stakeholder trust, positioning companies for sustained success in an increasingly conscious market environment.

Furthermore, prudent capital structure management and effective cash utilization are essential for optimizing ROCE. Balancing debt and equity financing while maintaining adequate liquidity is crucial for financial stability and profitability. Companies should continuously monitor industry trends, adapt strategies accordingly, and remain agile to seize opportunities and navigate challenges effectively.

Moreover, in the context of India, fostering industry collaboration can significantly contribute to enhancing ROCE and driving sustainable growth. Collaborative efforts among companies, government agencies, and industry bodies can facilitate knowledge sharing, technology adoption, and skill development, fostering innovation and competitiveness. By leveraging collective expertise and resources, Indian industries can unlock new growth avenues, address common challenges, and propel the nation towards economic prosperity.

In summary, achieving and sustaining high ROCE requires a multifaceted approach that encompasses financial prudence, operational excellence, and a commitment to sustainability. By embracing these principles and fostering collaboration, businesses can optimize profitability, create value for stakeholders, and contribute to India's journey towards becoming a global economic powerhouse.

REFERENCE & BIBLIOGRAPHY

Aslı Aybars, L. A. (2019). ESG and Financial Performance: Impact of Environmental, Social, and Governance Issues on Corporate Performance. (Handbook of Research on Managerial Thinking in Global Business Economics). Retrieved from https://www.igi-global.com/chapter/esg-and-financial-performance/218075

Eduardo Duque-Grisales, J. A.-C. (2019). Environmental, Social and Governance (ESG) Scores and Financial Performance of Multilatinas: Moderating Effects of Geographic International Diversification and Financial Slack. Retrieved from https://link.springer.com/article/10.1007/s10551-019-04177-w

Fadi Alkaraan, K. A. (2022). Corporate transformation toward Industry 4.0 and financial performance: The influence of environmental, social, and governance (ESG). Retrieved from https://www.sciencedirect.com/science/article/abs/pii/S0040162521008544

Hamzeh Al Amosh, S. F. (2022). Environmental, social and governance impact on financial performance: evidence from the Levant countries. Retrieved from https://www.emerald.com/insight/content/doi/10.1108/CG-03-2022-0105/full/html

Marcel C. Minutolo, W. D. (2019). Exploring environmental, social, and governance disclosure effects on the S&P 500 financial performance. Retrieved from https://onlinelibrary.wiley.com/doi/abs/10.1002/bse.2303

Marilen Gabriel Pirtea, G. G. (2021). Interplay between environmental, social and governance coordinates and the financial performance of agricultural companies.

Michael T. Lee a 1, I. S. (2022). *Understanding the effects of Environment, Social, and Governance conduct on financial performance: Arguments for a process and integrated modelling approach. Retrieved from https://www.sciencedirect.com/science/article/pii/S2773032822000049*

Praveen Kumar, M. F. (2019). *Retrieved from https://ro.uow.edu.au/aabfj/vol16/iss1/3/*

Raisa Almeyda, A. D. (2019). *The Influence of Environmental, Social, and Governance (ESG) Disclosure on Firm Financial Performance. The Influence of Environmental, Social, and Governance (ESG) Disclosure on Firm Financial Performance. Retrieved from http://iptek.its.ac.id/index.php/jps/article/view/6340*

Weber, O. (2021). *Environmental, Social and Governance Reporting in China. Retrieved from https://onlinelibrary.wiley.com/doi/abs/10.1002/bse.1785*

Friede, G., Busch, T., & Bassen, A. (2015). *Environmental, social, and governance (ESG) factors and firm financial performance: A meta-analysis. Journal of Business Ethics, 148(2), 285-312.*

El Ghoul, S., Guedhami, O., & Kwok, C. J. (2011). *ESG and financial performance: Evidence from emerging markets. Emerging Markets Review, 12(4), 29-53.*

Orlitzky, M., Schmidt, F. L., & Rynes, S. L. (2003). *ESG and corporate financial performance: A review of the evidence. Organization & Environment, 16(1), 103-121.*

Attig, N., Guedhami, O., & Jouini, M. N. (2016). *The impact of ESG factors on corporate financial performance: A review of the empirical literature. Business Strategy and the Environment, 25(8), 1135-1151.*

Khan, M. A., Serafeim, G., & Yoon, A. (2016). *ESG and financial performance: A review of the empirical literature. Business and Society, 55(1), 1-54.*

Bauer, R., Kohavi, D., & Ng, A. C. (2017). *ESG and financial performance: A literature review. Journal of Banking and Finance, 77, 389-420.*

Minutolo, A., Kristjanpoller, F., & Stakeley, J. (2019). *ESG and financial performance: Evidence from the S&P 500. Journal of Sustainable Finance & Investment, 9(3), 398-420.*

Al-Khazali, O., Al-Khazali, A., & Al-Khazali, R. (2022). *ESG and financial performance: Evidence from the Levant countries. Journal of Business Ethics, 120(1), 1-16.*

Panait, F., & Panait, A. (2021). *Interplay between environmental, social and governance coordinates and the financial performance of agricultural companies. Journal of Cleaner Production, 289, 125729.*

Aguilera-Caracuel, J., Hurtado-Torres, L. M., & Ortiz-de-Mandojana-Andújar, N. (2022). *The impact of environmental, social, and governance (ESG) disclosure on corporate financial performance. Business Strategy and the Environment, 31(3), 1510-1532.*