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# How do sustainability practices influence firms' financial performance and long-term value creation

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# Abstract

This research shows how environmental, social, and governance (ESG) performance relates to business financial outcomes, emphasizing both profitability and market value. This study aims to give a comprehensive and reliable analysis of ESG impacts company performance, given the growing significance of sustainable financing and the conflicting findings of previous studies.

The research utilizes many economic approaches, such as baseline regressions, extended models with firm-specific control variables, pillar-level disaggregation, robust standard errors, and generalized least squares (GLS) estimation, based on a large firm-level dataset. Return on equity (ROE) is a measure of corporate financial performance, and the price-to-book (P2B) ratio is a proxy for business value. The differentiation between external market valuation and internal operational performance is made possible by this dual-measure approach.

The results show that there is a positive and statistically significant relationship between aggregate ESG performance and ROE, suggesting that firms that exhibit better ESG engagement tend to enjoy better profitability. This relationship is consistent across alternative model specifications and estimating methods, which indicates that sustainability practices improve operational efficiency and stakeholder management. But the analysis also shows that ESG performance and firm value, which is determined by the price-to-book ratio, are continuously negatively correlated. The research suggests that financial markets may discount ESG engagement in the short term, likely because of concerns about higher expenses, reduce managerial flexibility, or uncertainty regarding the timing of ESG related financial benefits.

Looking at each ESG area, the impacts are different. Though environmental performance is linked to higher profitability, it has little effect on firm valuation, so markets may not quickly see the benefits. Social performance does not affect profits, but it is associated with lower firm value. The short-term costs of better monitoring and compliance are likely the reason why government performance is tied to lower profits and firm value.

Overall, results indicate a difference between market value and accounting results when it comes to ESG. Although sustainability helps to increase profits for businesses, markets might not notice or reward these gains immediately. This research highlights the need to consider the long term when judging sustainability initiatives and provides strong evidence for ESG research.

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The academic staff and faculty members of my department provided me with their backing through their research-oriented setting which taught me vital theoretical and methodological content during my academic time.

The research needed data sources and research tools which I recognize will help finish this empirical analysis. The research required access to dependable databases and artificial intelligence tools and statistical software to perform the econometric analyses which this thesis contains.

I want to thank my family and closest friends who have maintained their support through all my academic years. Their collective backing together with their ability to understand each other became vital for completing this research project.

# Table of Contents

# Chapter 1

# Introduction

## 1.1 Background and Motivation

After 2000 sustainability not only considered as an ethical matter. It is an important operational system which guides the choice of funding and business operations. Now a days, the valuation of company not considered by solely their profit and loss. There are some reasons to change it such as regulatory requirements, investor choices, stakeholder involvement, public awareness. Company will succeed that time when it can achieve 03 things together economic, environmental and social performance Elkington(1997).

The changes arise new question that how sustainable business practices affect corporate financial performance. In traditional finance theory mainly focused on profit maximization of companies. According to Friedman (1970) Spending company resources on social or environmental goals results in agency costs which can decrease shareholder value. ESG standard investment will lower profits in the short term because companies must spend more on following rules, capital projects, and management time.

Stakeholder theory offers a more comprehensive organizational framework if we compare it with traditional view of the firm. Companies function within a variety of stakeholder groups, such as their employees, clients, suppliers, regulatory agencies, and local communities, and managing stakeholder interests improves business outcomes explained by Freeman (1984).

Financial performance is boosted by investments that assist workers, preserve open governance systems, and safeguard the environment. These investments lead to lowering risk and fostering long-lasting business relationships. Research showed by Orlitzky Schmidt and Rynes's (2003), companies that excel in doing social activities will fare better financially.

The focus of ESG considerations are now capital markets, which use them to direct their operations. Because in practice, institutional investors are more familiar with sustainability indicators than short-term financial rewards, they are now using ESG criteria for portfolio selection and risk assessment (Friede, Busch, & Bassen, 2015). Regulations that force businesses to provide sustainability statistics while promoting their social responsibilities have

been established by the European Union and other countries (European Commission, 2021). Since ESG performance affects businesses to obtain finance, how their stock value performs, and their scope to distribute capital, financial institutions now view it as a important financial component.

Though the market value of ESG practices is rising, research studies have not clearly established the financial effect of these practices. Research findings demonstrate that corporate social responsibility has a positive impact on business profitability and company value. But some studies found no correlation or negative outcome. The current research will investigate this matter because different experts have not reached agreement about this issue.

## 1.2 Research Problem and Gap

There is conflicting data in the academic literature that provides mixed evidence on the relationship between sustainability practices and corporate financial outcomes. According to research, businesses which achieve highest ESG performance levels will outperform their industry peers in financial performance. Through this research, Eccles Ioannou and Serafeim (2014) shows that organizations who prioritize sustainability will achieve superior operational performance and financial market returns. According to Porter and van der Linde (1995), environmental regulations which are properly designed encourage business to create new solutions which reduce their expenses from following the rules.

Many research highlights the potential costs of ESG engagement. According to agency theory, managers could invest too much in sustainability projects because they want to build their personal reputation and achieve goals that do not affect financial performance, which lowers shareholder value (Jensen & Meckling, 1976). Because sustainability projects require a big amount of investment to become operational, socially responsible initiatives lead to decreased short-term financial performance research by Brammer, Brooks and Pavelin (2006) and López, Garcia and Rodriguez (2007)

Performance measurement tools using businesses create new operational discrepancies. Short-term profitability of companies becomes visible through return on equity (ROE),which shows how expenses impact current financial result, but investor's use Tobin’s Q and price-to-book ratio (P2B) to predict future business performance and risk levels (Fama & French, 1992).When businesses evaluating short term accounting performance against their long-term firm value through sustainability practice implementation.

Research studies combine ESG data into a single, unified score which might conceal different impacts that each environmental social and governance element produces. According to the research done in the past, these elements create separate paths which lead to organizational financial performance (Gillan, Koch, & Starks, 2021). Through their environmental initiative programs, organizations can decrease their resource consumption and avoid regulatory penalties. Organizations that engage in social work activities will lead to better employee productivity, but their governance systems will need to invest more in monitoring expenses and compliance costs. Researchers need to conduct their analysis at a more detailed level due to the various features in this data.

The current research study examines how ESG practices impact both short-term financial outcomes and long-term corporate value, while separating the various effects of various ESG components. The research provides value to sustainability discussions because it shows that sustainable methods either need financial costs or provide monetary value or produce financial results that blend negative and positive consequences.

## 1.3 Research Question and Objectives

The following is the formulation of the main research topic for this thesis, which is guided by above discussion:

What effect do sustainability practices have on the financial performance of businesses and their capacity to build long-term value?

The research investigates this main question by answering the following research questions.

1. The study uses short-term return on equity (ROE) metrics to investigate how overall ESG performance affects financial success.

2. The study examines how ESG performance affects the price-to-book ratio (P2B), which affects long term firm value

3.The research investigates Environmental Social and Governance elements; that have separate effects on business value and financial performance.

4.The research uses a variety of modeling approaches and statistical evaluation tools to examine the stability of experimental results.

This research investigates these three goals to determine whether sustainable measures help firms achieve better financial results or if they obstacle their financial performance.

## 1.4 Contribution of the Study

The research adds new information to what researchers have already investigated. The model evaluates financial performance indicators which come from accounting records together with market value indicators to assist researchers in differentiating between short-term profitability and long-term business value. This approach responds to calls by Friede et al.(The study links experimental data with the specific time frame required by sustainability investment strategies using Edmans (2023) and Edmans (2015).

The research uses a detailed ESG framework which examines three distinct ESG elements as well as their combined impacts. The research issues raised by Gillan et al. (2021) regarding the overuse of composite ESG scores, scientists use particular methods to study how sustainability initiatives affect business operations which solve the research problems.

The research uses a big database and a comprehensive statistical methodology, including generalized least squares modeling, robust standard error calculation, and ordinary least squares modeling. Research design uses strict methods which generate dependable results while preventing researchers from coming to incorrect conclusions.

## 1.5 Structure of the Thesis

The rest of the thesis is organized as follows. The book's second chapter establishes the fundamental concepts of ESG while using theoretical models to show how sustainability impacts financial outcomes. The third chapter of the study looks at previously collected research data to create its theoretical framework and establish research questions. All of the data elements, variables, and specific econometric methodology are explained in the fourth chapter. The research's fifth chapter presents and evaluates the findings of obtained results. The thesis conclusions are presented in the final section of chapter six, which summarizes the research findings and offers recommendations for management and policy as well as future research direction.

# Chapter 2

# ESG Background and Theoretical Framework

## 2.1 Sustainability and the Emergence of ESG

Sustainable development aims to achieve economic growth through strategies that save the environment and promote social health. The World Commission on Environment and Development defined sustainable development which states that current demands should be satisfied without jeopardizing the ability of future generations to fulfill their own needs (WCED, 1987). The corporate sector now implements standardized sustainability policies that go beyond corporate giving and minimum regulatory obligations.

The ESG framework serves as the financial market framework that applies sustainability principles. ESG factors are widely recognized by the financial sector as vital business elements which help organizations determine their risk exposure and future operational success. The United Nations Global Compact established ESG integration as a formal practice in 2000 while The Who Cares Wins report from 2004 established direct financial links between ESG factors and investment decisions (UNEP FI, 2004). Investors, regulators, and academic researchers now employ ESG analysis tool as a fundamental evaluation method.

The financial industry is now using ESG to convert non-monetary data into measurable performance metrics. The construction of ESG scores depends on information which companies reveal about their environmental effect and their workplace practices and their corporate governance structure and their disclosure methods. Data providers use a variety of research methods to evaluate ESG metrics to evaluate business potential and corporate sustainability risk management (Berg, Kölbel, & Rigobon, 2022).The empirical relevance of ESG in corporate finance research is supported by this conversion of sustainability into quantifiable financial metrics.

## 2.2 Environmental Pillar

The environmental pillar shows how companies affect environment during their management of business operations. The standard measurement of sustainability assessment include greenhouse gas emissions, energy efficiency metrics and waste management techniques, water consumption rates and environmental innovation levels. Because they must fulfill all regulatory

standards, organizations need to allocate significant financial resources to the implementation of environmental practices.

According to the traditional shareholder-oriented approach, these investments will decrease financial performance in the short term. Friedman (1970) supports corporate funding of legally compliant environmental programs because additional investments would create unnecessary expenses that could reduce business profitability. The viewpoint shows how environmental practices lead to negative results that harm accounting performance through their impact on return on equity metrics.

According to the Porter Hypothesis (Porter & van der Linde, 1995), environmental rules create an atmosphere that encourage businesses to develop new technologies that reduce their influence on the environment while increasing the efficiency of their operations. Businesses which implement eco-friendly technologies in advance will experience lower production costs and better operational performance and market advantage. Diverse studies have revealed either positive relationships or no significant relationships between environmental performance and financial results, research findings regarding this hypothesis are contradictory (Ambec et al., 2013).

According to the evaluation procedure, organizations who do well in environmental matters will experience decreased chances of facing environmental regulations and they will become less responsible for environmental harm. Investors use environmental initiatives to predict business stability which leads them to increase their valuation of companies despite these initiatives needing immediate financial expenses (Clark, Feiner, & Viehs, 2015).

## 2.3 Social Pillar

The social pillar shows how a company engages with its employees, customers and suppliers and the broader community. The framework includes six elements which are labor standards, employee safety, training and development, diversity, human rights, product responsibility and community engagement. Social practices are closely related to human capital and organizational culture.

Stakeholder theory's primary theoretical framework makes it possible for researchers to examine social practices. According to Freeman (1984), businesses create value by effectively managing all stakeholder relationships instead of focusing solely on shareholder relations. Businesses that invest in customer satisfaction and employee welfare programs will achieve

higher productivity, lower employee turnover, and better customer relations. Edmans (2011) used empirical data to show that businesses with happy employees will outperform the stock market in the long run because social practices create valuable assets that traditional financial metrics fail to measure.

Organizations must spend money on direct financial costs associated with social projects. Organizations face short-term financial difficulties because of the need to increase employee salaries, improve working conditions, and implement community development programs. Brammer Brooks and Pavelin (2006) discovered that businesses that engage in social responsibility tend to experience lower short-term financial performance because of these costs. Organizations experience financial effects of social practices that become apparent through their selected measurement criteria and time periods.

## 2.4 Governance Pillar

The governance pillar describes the systems that businesses use to achieve control and monitoring of their operations. The five components of the framework are executive compensation, board independence and composition, shareholder rights, transparency, and internal controls. The main solution to solve ownership-control separation agency problems involves implementing governance systems.

Agency theory shows that managers prioritize their personal interests over shareholder value maximization because they have more knowledge than owners and there does not exist enough control (Jensen & Meckling, 1976). Governance systems are primarily used to connect CEO compensation with investor goals, which improves corporate performance. Empirical research indicates that companies operating in markets with inadequate investor protection will have better financial outcomes with higher firm value if they have well-implemented governance systems (La Porta et al., 2002).

The process of governance reform implementation will result in higher expenses because organizations need to monitor their activities and perform compliance evaluation procedures. Administrative burdens and managerial flexibility may be increased by increased disclosure requirements, regulatory oversight, and board monitoring. The short-term financial reports show negative results because of governance improvement initiatives, but these changes will produce positive long-term firm value.

## 2.5 Theoretical Perspectives Linking ESG and Financial Outcomes

The effect of ESG practices on financial performance is explained by many theoretical frameworks. According to Friedman's (1970) shareholder theory, ESG measures have little effect on short-term financial performance since they require businesses to spend more money. According to Freeman's (1984) stakeholder theory, ESG practices build good stakeholder relations while minimizing an organization's exposure to non-financial business risks.

According to Legitimacy theory organizations implement sustainability practices because they need to preserve their social approval and institutional acceptance (Suchman, 1995). Organizations which follow social norms will decrease their probability of receiving regulatory penalties and damage their reputation, which helps them maintain their business value in the long run. The resource-based view explains that ESG-related capabilities which include environmental innovation and human capital development function as strategic resources which generate lasting competitive advantages (Barney, 1991).

The financial effects of ESG practices according to these theories exist in different forms and continue to change over time. The different ESG dimensions together with performance indicators and investment duration create distinct variations between them. The following chapters use theoretical ambiguity which serves as their foundation for empirical research.

## 2.6 ESG and Financial Performance: Short-Term versus Long-Term Perspective

The lack of definitive proof about ESG performance effects on financial results stems from the difference between immediate financial results and future market-based value assessments. The financial performance indicator return on equity (ROE) displays actual profitability data which companies achieved during their previous accounting year. The implemented measures show strong reaction to the direct expenses which sustainability investments require for their implementation (Fama & French, 1992).

The perspective shows that ESG initiatives lead to negative results which negatively affect financial performance in the short term. The first expenses for environmental investments need major financial support to deploy advanced clean technologies and transform manufacturing operations. Social initiatives need immediate financial investment to establish their programs which include employee training and wage improvement and workplace safety initiatives.

Organizations need to allocate funds for both compliance and monitoring activities when they implement governance reforms. The first period of sustainability practice implementation makes accounting-based measures unable to measure all the complete long-term benefits.

The market-based measures, which include Tobin's Q and price-to-book ratio show how investors predict future cash flow production and business expansion potential and risk levels. The forward-looking indicators tend to include ESG practice advantages which produce long-term benefits through risk reduction and regulatory compliance and reputation enhancement. Edmans (2023) supports the need to assess sustainability through long-term perspectives because ESG-related advantages emerge slowly instead of right away.

The different performance metrics used in ESG practices would produce varying results according to this distinction. The short-term financial results of a company will decrease because of elevated expenses, yet investors will understand sustainability as a indicator which leads to better long-term company worth. The dual nature of ESG functions as a theoretical framework which enables researchers to explain why academic research shows ESG practices produce both detrimental expenses and beneficial value generation.

## 2.7 Transmission Channels of Environmental, Social, and Governance Pillars

Research shows how ESG practice pillars affect business operations through their specific transmission mechanisms which reveal the financial effects of ESG practices.

The environmental pillar generates financial effects because it helps organizations enhance their operational performance and create new products and reduce their business risk exposure. The first expenses for energy efficiency and waste reduction and emissions control programs will result in reduced resource usage and decreased environmental penalty expenses during future operations. Porter and van der Linde (1995) show that organizations which start environmental programs first will get market advantages because they develop innovative solutions which result in enhanced operational performance. Organizations which reduce their energy consumption and optimize their resource utilization will achieve sustainable financial advantages which result in enhanced business performance throughout the long term.

The social pillar operates through two main activities which involve human capital development and maintenance and stakeholder relationship upkeep. Organizations that establish workplace safety and training programs will achieve employee satisfaction which

leads to better productivity, and they will keep their staff without needing to spend money on future employee recruitment and training costs. Edmans (2011) shows that organizations which establish strong employee relationships will achieve superior stock market performance because of their sustained investment performance. Organizations which dedicate resources to employee wellness programs will experience better employee morale and stronger employee dedication and enhanced service delivery quality. The benefits from social investments will not appear in accounting profits during the first period because these investments require initial costs.

Financial results of organizations depend on the governance pillar because it helps them monitor performance and maintain control while keeping their strategies on track. Organizations that establish robust governance systems will reduce agency conflicts which produce better decision outcomes that result in elevated firm value (Jensen & Meckling, 1976). Organizations need to increase their administrative funding because they must reveal more information and create board oversight systems to achieve governance reform. The company will decrease its immediate costs, which will decrease its current profitability, but these expenses will establish better financial reporting and risk reduction to build investor confidence for future years.

The different transmission paths indicate that ESG data unification through a single score would eliminate important distinctions between its individual components. Research need to evaluate specific pillar effects because this process enables them to identify which economic factors affect their research results.

## 2.8 Hypotheses Development

The research develops particular hypotheses based on theoretical frameworks to analyze how ESG practices affect corporate financial performance.

Organizations which achieve better ESG performance will experience improved business results because they can build stronger relationships with stakeholders and minimize their exposure to non-financial risks according to stakeholder theory and resource-based view. Shareholder theory shows that ESG investments will reduce short-term profitability because they need companies to spend more money. Accordingly, the first hypothesis is formulated without imposing a directional restriction:

H1: ESG performance shows a strong link to firms' immediate financial results which we measure through return on equity (ROE).

The long-term advantages of sustainability practices become evident through market-based methods which companies use to determine their firm value. Investors tend to value companies with excellent ESG performance because they perceive these businesses as having reduced risk levels and better potential for future success (Clark et al.,2015). This leads to the second hypothesis:

H2: ESG performance shows a strong connection to long-term value creation because it affects the price-to-book ratio (P2B) of firms.

The different methods through which ESG pillars create their effects will generate separate results for environmental social and governance practices. The company will achieve operational efficiency and product innovation through environmental initiatives which will also develop human resources and governance systems will track performance better, but these changes will require short-term financial investments. The following hypotheses relate to each pillar which we have identified.

H3: The three ESG pillars which include environmental and social and governance performance show strong links to both financial performance and firm value of companies.

The three ESG dimensions create separate economic pathways which affect corporate performance. The combination of environmental initiatives with operational efficiency and innovation improvements and social practices that build human capital and stakeholder relationships and governance structures that enhance monitoring and transparency will occur. The practices require immediate financial investment which generates different financial performance results in reports and market value assessments that produce distinct impacts on present financial performance and future corporate value.

The three pillars of ESG create separate economic pathways which produce different effects on corporate performance. Organizations that implement environmental initiatives will achieve improved operational performance and innovative thinking while social practices enable workers to produce more and build stronger relationships with stakeholders and governance systems improve monitoring systems and disclosure practices become more transparent. The effects will generate various levels of impact which will impact both current financial results and long-term market value. Therefore, analyzing ESG at the pillar level provides deeper

insight into how sustainability performance translates into financial performance and firm value. The following hypotheses establish a systematic approach which guides the research analysis throughout the next chapters.

# Chapter 3

# Literature Review and Hypothesis Development

## 3.1 Introduction to the Literature on ESG and Corporate Financial Outcomes

Research has extensively studied the connection between environmental social governance practices and their impact on corporate financial performance, but no consensus exists about their relationship. Research now focuses on ESG engagement effects which analyze business results and monetary constraints by studying companies' sustainable practices in their operational choices and funding choices. Research on ESG financial performance relationships has produced numerous studies but scientists remain undecided about whether ESG factors lead to better or worse financial results.

The initial academic discussions about this subject followed the conventional shareholder value approach. Friedman (1970) supports businesses to pursue maximum shareholder value through legal operations which makes him view social and environmental investments as unnecessary costs. The framework requires ESG initiatives to decrease profitability because they consume resources which should be used for activities that create value. The initial doubts about corporate social responsibility received their strongest support from this particular viewpoint which still affects researchers who focus on corporate financial results during short periods.

The following theoretical work presented fresh perspectives which expanded the conventional knowledge about business organizations. Stakeholder theory which Freeman (1984) developed shows that businesses function through various stakeholder groups which maintain their connection through common interests. The management of stakeholder relationships according to this perspective results in sustainable economic benefits because it creates trust relationships which minimize conflicts that lead to enhanced organizational operational efficiency. The theoretical change enabled researchers to discover that ESG practices lead to better financial results instead of causing damage to performance.

Research findings exist in separate isolated studies. Research studies have shown that ESG practices create positive relationships with accounting performance indicators, but other studies have found no connection or even negative results. The research by Margolis and Walsh (2003) shows that different study approaches together with varying data collection methods and measurement techniques lead to these inconsistent results. Research results depend heavily

on the distinction between accounting-based indicators which include return on assets and return on equity and market-based measures which include Tobin's Q and the price-to-book ratio. The accounting data shows present short-term profitability of companies, but market-based indicators show how investors predict business expansion and evaluate risk levels (Fama & French, 1992).

Research studies face increased difficulties because ESG contains multiple elements which create additional obstacles for conducting studies. The three environmental social governance practices operate through separate economic systems which produce different effects on financial performance. The combination of these dimensions into one composite score could hide opposing effects which lead to conflicting results between different research studies. Research from the previous few years demonstrates that ESG needs separate evaluations of its three components to disclose their distinct financial effects.

Given these theoretical and empirical challenges, a systematic review of prior research is essential. The current research combines all available studies which investigate ESG factors that affect financial performance through their positive and negative and neutral impacts while studying market-based valuation effects and studying evidence from each pillar. The research foundation emerges from the literature review which shows major inconsistencies and flawed research methods that previous studies contained.

## 3.2 ESG and Corporate Financial Performance: Evidence of a Positive Relationship

Research studies demonstrate that organizations which adopt environmental social and governance practices will achieve superior financial results. Studies adopting this perspective argue that sustainability initiatives enhance firm performance by strengthening stakeholder relationships, improving operational efficiency, and reducing exposure to non-financial risks. The research bases its analysis on stakeholder theory and resource-based view of the firm as its core theoretical framework.

The first detailed assessment of corporate social performance and financial performance was conducted by Orlitzky Schmidt and Rynes (2003) through their meta-analysis. The researchers used statistical methods to prove that businesses which perform socially responsible activities will achieve better financial results. The authors demonstrate that accounting-based measures demonstrate stronger performance relationships which become more evident through analysis

of longer time periods. The authors show that sustainability leads to superior long-term performance instead of generating short-term financial gains.

The research conducted after the first study established that the two variables continue to show a positive relationship. Eccles Ioannou and Serafeim (2014) analyzed businesses which achieved superior sustainability results against those which performed poorly in sustainability throughout different time periods and found that organizations with superior sustainability delivered better financial results through their return on assets and return on equity and stock market returns. The research findings emerged from governance systems which allowed organizations to develop strategic plans and make controlled investment choices and boost their market accessibility. The researchers discovered that ESG practices function through existing organizational frameworks which enable businesses to develop sustainable value that lasts.

Research studies about ESG social aspects have proven that these elements generate beneficial financial results. Edmans (2011) shows that companies which achieve high employee satisfaction levels will produce better long-term stock market performance than other firms despite their business characteristics and market position. This finding supports the argument that investments in human capital represent a source of competitive advantage rather than a cost burden. Research by Lins Servaes and Tamayo (2017) showed that businesses with strong social networks performed better during the global economic crisis because their social responsibility initiatives established stakeholder trust which safeguarded their business activities.

Research findings from environmental performance studies show that ESG factors lead to better organizational performance according to environmental performance studies. Porter and van der Linde (1995) demonstrate that organizations which start environmental programs first will create new solutions which reduce their total environmental compliance expenses. Research studies which build upon this theory show that organizations which invest in environmental efficiency management achieve reduced production costs and enhanced operational performance which results in superior financial performance (Ambec et al.,2013). The research data shows that environmental rules do not produce any negative effects which would impact business operational performance.

Research shows that ESG practices lead to better corporate financial results because they improve operational performance and risk control and build stronger relationships with stakeholders. The positive ESG–performance relationship supporters recognize that these

advantages will not appear right away, but they will become visible through time. The research shows that researchers must distinguish between short-term accounting results and long-term financial performance when they conduct experiments.

## 3.3 ESG and Financial Performance: Negative and Insignificant Evidence

Research studies have shown ESG practices lead to better financial results, but other studies have found no connection or even negative results between these practices and financial performance. The research results derive from shareholder theory and agency theory which show that sustainability investments create financial expenses which lead to decreased organizational operational performance. According to Friedman (1970), businesses exist to create profits which represent their primary purpose while shareholders need to fund all social and environmental programs that go beyond what the law requires. The perspective predicts ESG initiatives will decrease financial performance because they create additional operational expenses and regulatory compliance fees which do not produce sufficient financial benefits.

Agency theory supports this argument through its demonstration of how organizational conflicts between managerial and shareholder interests impact the organization. Jensen and Meckling (1976) explain that managers use ESG initiatives to build their personal reputation and fulfill their moral values and social obligations although these actions do not lead to shareholder value optimization. The current business environment makes investors doubt that sustainability investments represent actual strategic business value instead of being managerial tricks. ESG engagement receives excessive investment because monitoring systems fail to function properly, which produces no meaningful results.

The research data from empirical studies supports the theoretical issues which these studies have discovered. Brammer Brooks and Pavelin (2006) studied socially responsible companies in the United Kingdom to discover that these organizations achieved lower stock market returns than businesses which demonstrated inferior social responsibility. The authors state that businesses which engage in too many social activities will face market penalties because of their high operational costs and restricted ability to make strategic decisions. The research by López and his team (2007) shows that European businesses perform poorly financially because their short-term corporate social responsibility approach requires immediate financial backing for sustainability initiatives.

Research studies have discovered that ESG practices do not create any measurable financial effects which support the neutrality hypothesis. McWilliams and Siegel (2000) show that controlling firm-specific characteristics such as size and industry affiliation and research and development intensity does not prove any connection between corporate social performance and financial performance. The perspective views ESG activities as strategic business investments which generate financial results based on their alignment with company objectives instead of their social value.

The research indicates that ESG practices do not guarantee better financial results because they create temporary financial expenses which exceed the current advantages of implementation. The mixed research findings demonstrate that analysts need to evaluate sustainability practice financial effects by considering three essential elements which include industry characteristics and regulatory environments and time horizons.

## 3.4 ESG and Firm Value: Market-Based Evidence

The ESG literature contains two main sections which study corporate financial performance through accounting indicators yet researchers now study ESG practices through market-based firm value assessment methods. The forward-looking nature of Tobin's Q and price-to-book ratio as firm value indicators shows how investors use these metrics to predict upcoming cash flows and business expansion potential and risk levels. These measurement methods provide better results for evaluating sustainability practice effects on long-term performance than traditional short-term accounting indicators.

Research findings indicate that organizations which achieve superior ESG (Environmental Social Governance) performance metrics will obtain higher market value. Clark Feiner and Viehs (2015) show that organizations which establish strong ESG standards will defend their business operations against upcoming environmental and social and regulatory issues which investors currently use to assess company worth. Sustainability initiatives which reduce corporate risk exposure and strengthen organizational stability will probably decrease funding expenses while resulting in better market value assessments. The research by Ioannou and Serafeim (2017) shows that companies which disclose their ESG data fully will achieve higher market value because their disclosure quality reduces information gaps which results in better analyst prediction accuracy. The research shows that ESG engagement produces a market signal which demonstrates that companies dedicate themselves to transparency and their commitment to long-term strategic planning for their capital market investors.

Other studies emphasize that ESG practices influence firm value primarily through risk-related channels rather than growth enhancement. Edmans (2023) explains that financial markets provide sustainability benefits through reduced market volatility and decreased potential losses instead of generating higher investment returns. The interpretation shows that companies which achieve high ESG performance will not automatically receive higher Tobin's Q or price-to-book ratios, but they will experience better valuation stability and reduced market value declines. The research method explains why academic studies fail to detect sustainability engagement valuation effects although companies show strong environmental dedication.

Research studies about ESG factor effects on corporate value have generated conflicting results. The authors Hong Karolyi and Scheinkman (2012) explain that businesses which focus on ESG principles will receive restricted investor backing because specific investors select to stay away from sustainable companies because of their investment choices and their uncertainty about future business growth. The current lack of investor interest in the market sector works to decrease the value of companies operating within this sector. Organizations which adopt ESG initiatives create an impression that their leadership operates with reserve which leads investors who want growth to doubt their ability to drive fast business expansion.

Research studies show that ESG valuation effects appear through changes in market conditions and investor sentiment. During economic instability investors choose to invest in companies which demonstrate strong ESG practices because these businesses appear less vulnerable to market fluctuations and have lower risk exposure. The value of ESG factors decreases when economic growth happens at a fast pace because investors focus more on market expansion than on environmental and social issues.

The market-based literature shows ESG practices impact firm value through three separate mechanisms which reduce risk while making companies more transparent to investors. Research findings indicate that ESG valuation effects respond to particular market conditions which investors use to understand this information. The research findings demonstrate that organizations need to study firm value together with accounting-based performance indicators to understand fully how sustainability practices affect their financial results.

## 3.5 Pillar-Specific Evidence: Environmental, Social, and Governance Dimensions

The evidence for ESG assessment pillars contains information about environmental results and social effects and organizational governance systems. Research now shows that uniting ESG

elements into one score conceals important differences which exist between environmental and social and governance aspects. The financial results of each pillar depend on separate economic systems which produce different levels of impact.

Organizations which concentrate on environmental performance execute two main goals which include following regulatory requirements and maximizing resource efficiency and creating innovative sustainable solutions. Porter and van der Linde (1995) show that organizations which initiate environmental programs will develop innovative solutions which decrease their complete environmental compliance costs. Research findings about this theory have produced conflicting results. Research findings indicate that environmental performance generates better financial performance and higher company worth but other academic work demonstrates no relationship or adverse effects when pollution-based businesses must pay high costs for compliance (Ambec et al.,2013).

Social performance is closely linked to human capital and stakeholder relationships. Edmans (2011) shows through his study that organizations which achieve high employee satisfaction levels will produce better long-term stock market results because their social practices develop valuable assets which boost company value in upcoming years. Research findings indicate that social initiatives lead to right away financial losses because they result in higher operational expenses and labor costs (Brammer et al.,2006). The research shows that social performance leads to financial outcomes which depend on both the duration of analysis and the methods used to assess performance.

Governance performance is generally found to be positively related to firm value, as strong governance reduces agency conflicts and improves monitoring (La Porta et al.,2002). Organizations must spend their initial funds on governance reform compliance and administrative tasks which reduce their financial reporting performance during their first year of operation. Research need to separate governance performance from environmental and social aspects when studying ESG results because this distinction explains the trade-off between these elements.

## 3.6 Synthesis of Literature and Motivation for Hypothesis Development

The preceding literature review highlights that the relationship between Environmental, Social, and Governance (ESG) performance and corporate financial outcomes is complex and context dependent. Research conducted earlier has produced conflicting results which show both

positive and negative associations and no associations at all based on different theoretical approaches and performance indicators and observation periods and organizational settings. The study reveals multiple evaluation methods for ESG performance because no single method can determine its value which leads to the requirement for a complete empirical research design.

Research studies show that accounting performance indicators operate independently from market performance indicators which organizations use to measure their business success. The financial results of corporate decisions become available through ROE because this metric uses accounting data to generate its calculations. The initial costs of ESG programs require organizations to spend money on environmental technology and employee welfare and governance system development which results in short-term decreases in their financial performance according to accounting standards. Research data shows that these investments produce enhanced operational performance while they reduce financial risks and non-financial risks and create more efficient organizational control systems (Porter & van der Linde, 1995; Friede, Busch, & Bassen, 2015). The immediate financial results of ESG participation appear to be different from what the practice will produce in the future.

The price-to-book ratio (P2B) together with other market-based measures show how investors predict upcoming business expansion and both organizational risk levels and the value of non-tangible assets. Market valuations create value assessments through future-oriented data which depends on company transparency and reputation and strategic market position. Research from previous studies demonstrates that businesses which achieve outstanding ESG performance will reduce investor risk perceptions and gain market confidence which results in higher company value during particular market conditions (Clark, Feiner, & Viehs, 2015). Research studies indicate that ESG investments experience short-term market value decreases because investors select growth opportunities over risk management (Hong, Karolyi, & Scheinkman, 2012; Edmans, 2023). The research results create a need to study both accounting-based results and market-based results at the same time.

Scientists face major limitations when they attempt to use ESG scores for their research according to the conducted study. The three dimensions of ESG operate through separate economic systems which produce different impacts on business operational success. Organizations must adapt to environmental practice influence because these practices help them achieve better resource management and develop innovative solutions and maintain

compliance with regulations (Jensen & Meckling, 1976; La Porta et al.,). Organizations use social initiatives to develop their human resources while maintaining their stakeholder connections. The performance of monitoring operations and transparency standards and agency expense management depends on the design of governance systems (Jensen & Meckling, 1976; La Porta et al.,). 2002). The treatment of ESG as one unified construct obscures the different elements which generate opposing results that produce inconsistent research findings from previous studies.

Research indicates that ESG effects depend on environmental elements which consist of industry characteristics and regulatory frameworks and investment duration. Research conducted in various organizational environments has produced conflicting findings which organizations need to analyze through advanced analytical techniques and proper control systems (McWilliams & Siegel, 2000; Friede et al.,2015). The research challenges require an empirical study which will measure both short-term financial performance and long-term market value while separating ESG factors into their distinct elements.

The research design of this thesis combines separate empirical studies which evaluate ESG performance effects on corporate results through financial statements and stock market data while studying each environmental social and governance aspect independently. The research hypotheses from Section 2.8 use the theoretical arguments and empirical evidence from this chapter to create a systematic approach for analyzing the data which will be presented in the following chapters.

## 3.7 Methodological Differences and Measurement Issues in ESG Research

The ESG literature shows conflicting empirical results because researchers use different analytical methods to study their variables while facing difficulties when they try to measure these variables. The development process for ESG scores along with their meaning stands as a major essential problem. The different data providers use separate methods to calculate weights and disclosure rules and assessment methods which result in major differences between ESG ratings for identical companies (Berg, Kölbel, & Rigobon, 2022). The selection of ESG data source stands as the main element which shapes research findings instead of showing actual sustainability performance.

The evaluation process for ESG scores depends on corporate disclosure data which companies provide voluntarily but this approach creates doubts about companies presenting false

environmental information and choosing specific data points for disclosure. Organizations present their environmental initiatives through strategic methods, yet they conceal their sustainability weaknesses which produces misleading ESG ratings that do not show real operational improvements. The disclosure practices which Lyon and Maxwell (2011) describe create problems which make ESG metrics less reliable and produce research findings that are skewed. Research that depends only on ESG score aggregates might produce incorrect assessments about how sustainability practices affect financial performance.

The research contains two essential methodological problems which stem from model construction and endogenous variable effects. Organizations which achieve better financial results tend to have more resources available for sustainability investments which creates a situation where ESG performance appears to drive financial results. The research by Wintoki, Linck and Netter (2012) shows that researchers who do not address dynamic endogeneity problems will end up with wrong coefficient estimate values. The literature contains inconsistent results because researchers use different methods including fixed effects and instrumental variables to address this issue, but no approach provides a complete solution.

The selection of control variables which researchers include in their studies determines how their findings will turn out. Research studies include firm size and leverage and growth opportunities and industry affiliation as control variables, but different studies handle these variables differently. McWilliams and Siegel (2000) show that organizations which do not have proper controls or use wrong controls will not show how their environmental social governance practices affect their financial results. The research needs robust testing because the model specification choices made during the study determine what results ESG studies will produce.

The various methodological problems in ESG research indicate that conflicting results in ESG studies stem from both economic factors and variations in measurement approaches and research methodologies. The research needs to identify these study limitations because they impact on our comprehension of past research which drives the development of this thesis through its rigid econometric approach. The thesis achieves higher reliability in its results through its implementation of different model types and its execution of multiple verification tests.

## 3.8 Methodological Differences in Prior ESG Studies

Scientists achieve different results about ESG practice research which produces what effects on financial performance based on their selection of research methods. Organizations achieve

their best performance results through their unique performance measurement systems which produce the most significant variations in their results. Studies which analyze accounting information through ROA and ROE metrics demonstrate ESG performance does not create meaningful changes in financial results because these financial metrics concentrate on immediate profitability, but sustainability costs directly reduce their value (López, Garcia, & Rodriguez, 2007). Research that uses market-based indicators including Tobin's Q and price-to-book ratio to study investor expectations about future performance and risk levels produces mostly positive or no significant results (Clark, Feiner, & Viehs, 2015).

Research design presents itself as the main methodological problem which needs urgent resolution. The assessment of cross-sectional studies fails to include vital firm characteristics which researchers cannot measure which results in possible mistakes when evaluating ESG performance. Scientists can control firm characteristics that remain constant through time by using panel data research according to Wintoki et al. (2012) who also consider this method more reliable for sustainability research. The analysis of panel models faces endogeneity problems because researchers need to solve reverse causality effects. Firms with strong financial performance may simply have greater resources to invest in ESG initiatives, rather than ESG causing superior performance. The inability to solve this problem leads to ESG coefficients which show higher values than their actual measurements.

Researchers face challenges when they try to assess their ESG measurement results because of the complexities involved in ESG measurement. The ESG scores which data vendors MSCI and Refinitiv and Sustainalytics provide use different methods to determine their ratings, and they have different requirements for company disclosure. The study by Berg Kölbel and Rigobon (2022) shows that ESG rating correlations between different providers remain low because their results depend on the selected data instead of actual sustainability performance. Research findings become impossible to compare because of missing standardized measurement techniques which result in conflicting study results.

The selection of control variables determines the final results which ESG–performance estimates will produce. Research studies include firm size and leverage and liquidity and growth opportunities and industry affiliation as their main variables but they use different methods to measure these factors. McWilliams and Siegel (2000) demonstrate that organizations which select wrong control methods will either hide or create false evidence about ESG practices being more important than their actual worth. The different research

methods used in studies produce conflicting results because they depend on more than economic factors.

## 3.9 Regional and Institutional Context in ESG–Financial Performance Studies

Research findings about how ESG practices affect corporate financial performance show wide differences between different geographic areas and business environments. The different variations between countries stem from their unique regulatory systems and investor choices and market growth rates and public attitudes about business social obligations. The research results from one specific location fail to transfer directly to different geographical areas. Research shows that institutional quality stands as the primary element which determines if ESG initiatives produce financial benefits.

Research conducted in European and North American developed economies shows that organizations which perform well in ESG will achieve superior financial results. The economic value of sustainability practices becomes more important because these areas have powerful regulatory systems and active enforcement programs and well-informed stakeholders. Ioannou and Serafeim (2012) argue that firms operating in countries with stronger institutional environments are more likely to internalize ESG considerations into strategic decision-making. Investors back sustainable practices because better capital rates lead to increased company value for businesses that adopt these practices.

European markets show early adoption of sustainability regulations, and they require businesses to disclose their non-financial information. Research on European businesses shows that their ESG performance results in positive or no negative impacts which mainly affect environmental and governance aspects (Friede, Busch, & Bassen, 2015). Organizations which implement ESG practices under proper regulatory support will achieve better financial performance from their sustainability investments. The United States achieves different results because its corporate governance system operates through shareholder value maximization and companies choose to disclose information on a voluntary basis.

The connection between ESG elements and business financial results continues to be unclear for markets which have not fully developed. The two main obstacles which prevent sustainability initiatives from succeeding include inadequate regulatory enforcement and investors who lack sufficient knowledge about sustainability and organizations that do not provide enough transparency. The authors Khan Serafeim and Yoon (2016) explain that ESG

practices in these settings become symbolic actions which do not create meaningful financial effects. The limited financial resources of developing economies create a challenge for ESG investment because they prevent businesses from funding essential costs required for these investments.

The institutional theory framework enables researchers to explain why different regions develop at different rates. Organizations adopt ESG practices because they must demonstrate legitimacy within their institutional environment according to Suchman (1995). Organizations achieve better ESG engagement results through institutional sustainability norms because these standards help organizations gain social approval and defend their corporate brand reputation. The financial impact of ESG initiatives becomes less effective when institutions lack strength because ESG initiatives fail to generate sufficient legitimacy benefits.

The research demonstrates that ESG-performance financial connections depend on regional elements together with institutional systems which govern them. The different institutional frameworks require researchers to evaluate previous research results through their specific institutional frameworks while new empirical studies need to include variables which represent national regulations and institutional frameworks.

## 3.10 Linking Prior Literature to This Thesis: Research Gap and Expected Relationships

The research establishes connections between previous studies and this thesis by showing where knowledge gaps exist and by predicting which variables will affect each other.

Research conducted before this study showed that ESG practices generate intricate financial impacts which depend on the business context. Scientists have not proven that sustainability initiatives create better business performance and value according to ongoing sustainability research. Research results show significant differences because studies use different performance indicators and research methods and conduct their work in different geographic areas and evaluate different ESG aspects. The study investigates multiple unresolved problems because the current system lacks consistent application.

Research studies have concentrated on either financial performance through accounting data or market value of firms, but they do not combine these variables into a single empirical research model. The research fails to adequately study how short-term profit generation affects long-term market value assessment. Research findings about ESG initiatives show no impact

on financial performance indicators including ROA and ROE because these initiatives need financial expenses, but Tobin's Q and price-to-book ratio studies demonstrate their ability to create enduring financial advantages through risk management and corporate image enhancement (Edmans, 2023). The research lacks studies which evaluate these results through identical data analysis with identical modeling approaches.

Most empirical studies depend on composite ESG scores which hide the different ways ESG pillars affect performance. The three ESG dimensions function through separate economic pathways which produce varying effects on financial performance. The three examples demonstrate that environmental investments require substantial upfront costs which affect human resources and stakeholder relationships and governance systems to handle agent conflicts. The various elements in this situation would create opposing results which would lead to unpredictable results. The research shows that pillar-level analysis becomes essential because it reveals the actual financial effects which ESG practices create.

Third, the existing research base shows wide variation in how authors handle control variables together with their methods for testing robustness. The research includes firm size and leverage and liquidity and capital structure as standard variables but fails to establish their effect on ESG performance. The research on ESG faces ongoing challenges because endogeneity and autocorrelation problems continue to affect its results which makes it difficult to trust the calculated coefficients. The research methods used in studies contain multiple restrictions which produce conflicting results in published studies.

The research investigates these knowledge deficiencies through an extensive empirical research methodology. Specifically, it examines the relationship between ESG performance and both short-term financial performance and long-term firm value within a unified framework. The model separates ESG into three distinct categories which include environmental and social and governance elements to detect how each pillar affects the results. The research achieves improved results about sustainability practices that impact corporate financial performance through multiple model configurations and various verification tests and control factor combinations.

The research establishes its position between accounting performance and market-based valuation to provide new insights into ESG practices which create value or costs based on specific ESG dimensions and time periods

# Chapter 4

# Research Methodology and Model Specification

## 4.1 Sample Selection and Data Sources

The research design of this study applies quantitative methods to investigate how ESG practices affect corporate financial performance. The research uses data obtained from LSEG workplace (Refinitiv) which includes data from public companies operating in different business sectors. The research team used systematic methods to choose their samples because they needed data which would maintain consistency between different firms and time periods.

The initial sample consists of all firms for which ESG scores, and financial information are available during the selected study period. The research excludes all financial sector businesses which include banks together with insurance companies and all other financial institutions. Research confirms this exclusion because financial institutions follow separate regulatory systems which demand unique capital standards and financial reporting rules than those which apply to non-financial businesses (López, Garcia, & Rodriguez, 2007). The researchers used this exclusion criterion to select a wide range of non-financial businesses which made their research findings more useful for different applications.

The research duration depends on when researchers can obtain reliable ESG data and complete financial records from companies. The analysis includes only firms which provide full data for all necessary variables which include ESG scores and financial performance indicators and control variables. The analysis removes all observations which contain missing or incomplete information because such data points could create reporting bias through uneven data distribution. The filtering process produces a balanced panel which contains numerous firm-year observations for conducting reliable econometric analysis.

The ESG data originates from a popular ESG data provider which collects company-level ESG information through analysis of public disclosure documents. The ESG score functions as a single metric which combines data from all three pillars to evaluate corporate performance. The ESG assessment includes both an overall ESG score and separate pillar scores which measure environmental and social and governance performance for detailed analysis. Research studies show that these data sources function as main sources for ESG empirical studies

because they offer broad coverage through their established measurement protocols (Friede, Busch, & Bassen, 2015).

The financial data originates from a trustworthy financial database which offers official accounting records and market-based financial information about companies that have stock market listings. The return on equity metric from accounting data serves as the performance measurement while the price-to-book ratio represents firm value. The research team retrieved control variables from the same data source which contained market capitalization data and total assets information and leverage and liquidity measurement data to achieve internal consistency. All monetary variables receive adjustments to ensure they remain equivalent between different firms and time periods.

The final dataset unites ESG data with financial information from firms to analyze their present financial performance and their estimated company worth. The analysis benefits from both the extensive number of companies and the multiple-year research period because these elements create enough variation between businesses and time periods which enables powerful statistical analysis and allows for complex econometric methods in future sections.

## 4.2 Variable Definition and Measurement

The following section explains all variables which researchers used for their empirical study and shows how researchers transformed these variables into workable data points. Consistent with prior ESG and corporate finance literature, the variables are categorized into dependent variables, independent variables, and control variables. The research method produces direct results which scientists can analyze against their current empirical findings.

**Dependent Variables**

The research assesses corporate financial performance by uniting two financial performance indicators which merge accounting-based metrics with market-based valuation metrics. Return on Equity (ROE) functions as a short-term financial performance indicator because it demonstrates the amount of profit shareholders obtain from their investment capital. The empirical research community depends on ROE as their main metric because it enables them to assess managerial performance and monitor shareholder returns from their investments (Fama & French, 1992). The ROE metric shows its weakness because it uses past data to

measure performance which makes it sensitive to brief cost fluctuations that stem from sustainability investment choices.

The Price-to-Book ratio (P2B) functions as a valuation metric which helps investors determine the long-term worth of a company. This market-based indicator reflects investors' expectations regarding future growth opportunities and risk exposure. Previous research shows that market-based indicators generate better results for ESG practice effect assessment because they utilize future-oriented data which shows what investors expect (Clark, Feiner, & Viehs, 2015). The research uses ROE and P2B to separate between short-term profitability results and extended-term valuation performance.

**Independent Variables**

The main independent variable in this study consists of ESG scores which measure how well a company performs in environmental and social and governance aspects. The composite ESG score functions to evaluate how sustainability practices affect financial performance by analyzing their combined impact. The research uses pillar-level scores which evaluate environmental (E) and social (S) and governance (G) performance. The analysis requires ESG to be broken down into its separate elements because research shows each component produces financial effects through unique economic processes (Friede, Busch, & Bassen, 2015).

Environmental performance tracks how well companies perform their environmental responsibilities through their work on emission reduction and resource optimization and their development of new environmental solutions. Social performance includes three main areas which are labor practices and employee welfare and customer responsibility and community engagement. The quality of board structure and transparency and shareholder rights and internal controls make up the Governance performance assessment. The analysis of sustainability effects becomes more detailed through the combination of aggregate ESG measures with pillar-level ESG data.

**Control Variables**

The research includes multiple control variables which help researchers understand how company-specific elements affect both financial results and market value assessment. The use of market capitalization serves as a firm size indicator because larger companies tend to obtain better resource access and capital market entry. Total assets serve as an alternative size measurement which researchers use for their robust assessments. The debt percentage metric

reveals how capital structure affects companies because it shows how much debt a business uses, which affects both its profitability and its risk level. Current ratio is included to control liquidity, reflecting firms' ability to meet short-term obligations.

The research uses these control variables which previous ESG studies have applied to determine how sustainability practices affect financial performance (McWilliams & Siegel, 2000).

**Table 4.1: Variable Definition and Measurement**

| **Variable Type** | **Variable** | **Definition** | **Measurement** |
|---|---|---|---|
| Dependent | ROE | Return on equity measuring short-term profitability | Net income / Shareholders' equity |
| Dependent | P2B | Firm value reflecting market expectations | Market value / Book value |
| Independent | ESG | Aggregate ESG performance score | Composite ESG index |
| Independent | E | Environmental performance | Environmental pillar score |
| Independent | S | Social performance | Social pillar score |
| Independent | G | Governance performance | Governance pillar score |
| Control | MktCap | Firm size | Market capitalization |
| Control | TA | Firm size (robustness) | Total assets |
| Control | DtPer | Leverage | Total debt / Total assets |
| Control | CR | Liquidity | Current assets / Current liabilities |

## 4.3 Econometric Model Specification

The research investigates ESG practices in relation to corporate financial performance through panel regression analysis which enables the analysis of both individual company data and time-dependent patterns. The econometric framework is designed to assess the impact of ESG performance on short-term financial performance and long-term firm value while controlling for firm-specific characteristics. The research extends previous studies through its development of two independent models which analyze financial performance data from accounting records and market-based valuation information.

The baseline specification investigates how financial results respond to ESG performance metrics which are measured at the collective level. The return on equity (ROE) metric evaluates short-term financial performance but the price-to-book ratio (P2B) serves as the metric for firm assessment. The general baseline model can be expressed as follows:

**Model (1): ESG and Financial Performance**

$$ROE_{it} = \alpha + \beta_1 ESG_{it} + \beta_2 MktCap_{it} + \beta_3 DtPer_{it} + \beta_4 CR_{it} + \varepsilon_{it}$$

where i denotes firm and t denotes year. The ESG score represents the complete ESG assessment which $MktCap_{it}$, $DtPer_{it}$, and $CR_{it}$capture firm size and leverage and liquidity effects. The error term$\varepsilon_{it}$ contains all unmeasurable elements which impact how well firms perform.

To analyze long-term firm value, the same specification is estimated using the price-to-book ratio as the dependent variable:

**Model (2): ESG and Firm Value**

$$P2B_{it} = \alpha + \beta_1 ESG_{it} + \beta_2 MktCap_{it} + \beta_3 DtPer_{it} + \beta_4 CR_{it} + \varepsilon_{it}$$

These baseline models provide an initial assessment of whether aggregate ESG performance is associated with financial outcomes after controlling for key firm characteristics. Research conducted before this study shows that ESG pillars produce different financial effects which produce distinct financial results. The analysis extends to measure different effects by using environmental and social and governance components instead of the combined ESG score.

**Model (3): Pillar-Level ESG Model**

$$Y_{it} = \alpha + \beta_1 E_{it} + \beta_2 S_{it} + \beta_3 G_{it} + \beta_4 MktCap_{it} + \beta_5 DtPer_{it} + \beta_6 CR_{it} + \varepsilon_{it}$$

where $Y_{it}$represents either $ROE_{it}$or $P2B_{it}$. The research design allows the study to identify which ESG elements produce financial performance and firm value effects instead of making a general assumption about all ESG pillars.

The research uses different specifications to achieve robustness through the replacement of total assets with market capitalization for firm size measurement. The method reduces the possibility of market-based size measurement errors which produce results that match previous research using different control variables (McWilliams & Siegel, 2000). The analysis needs to perform strong standard error calculations together with generalized least squares (GLS) estimations because panel data demonstrates both heteroskedasticity and autocorrelation.

The econometric framework provides a complete method to analyze how ESG factors affect financial performance. The research unites baseline and pillar-level and robustness models to solve existing methodological problems which researchers have documented while creating a systematic framework for the following chapter's empirical findings.

## 4.4 Diagnostic Tests and Model Assumptions

The analysis requires researchers to verify that all necessary conditions for econometric model application exist before they can interpret the regression output. The failure to identify potential violations of these assumptions will produce estimates which become both inaccurate and less efficient while making statistical inference unreliable. The research performs multiple diagnostic tests which panel data analysis uses to check for stationarity and to detect multicollinearity and autocorrelation and heteroskedasticity and residual normality.

The first requirement demands researchers to verify that all variables in the study maintain stationarity because non-stationary data will generate incorrect results in spurious regression models. Non-stationary variables create deceptive relationships because their shared trends produce artificial economic connections which do not exist in market relationships. The Augmented Dickey–Fuller (ADF) test examines all essential variables which include ROE and P2B and ESG scores and the control variables. The null hypothesis of the ADF test assumes the presence of a unit root, indicating non-stationarity. Rejection of the null hypothesis implies that the variable is stationary. The results show that all variables maintain stationarity at their respective conventional significance levels, which validates the data for performing regression

analysis. The research findings from this study confirm previous ESG studies which analyzed firm-level panel data (Wintoki, Linck, & Netter, 2012).

The Variance Inflation Factor (VIF) functions as a method to determine the level of multicollinearity which exists between independent variables. High multicollinearity between variables leads to larger standard errors which hide the actual connections between independent variables and dependent variables. A commonly used threshold is a VIF value of 10, above which multicollinearity is considered problematic. The VIF results for ESG variables and control variables stay below this threshold which shows that multicollinearity does not affect the estimated models. The results indicate that the explanatory variables contain separate information which can be used together in the regression model.

The Durbin–Watson (DW) test functions as a third verification method which helps users detect residual autocorrelation in their data. Panel data analysis needs unique treatment of autocorrelation because time-dependent observations from the same firms create statistical links between them. The null hypothesis of the DW test assumes no first-order autocorrelation. The test results show that residuals contain positive autocorrelation which makes standard ordinary least squares (OLS) estimates less efficient. The research findings validate that generalized least squares (GLS) serves as an alternative estimation method because this approach addresses serial correlation issues directly.

Fourth, heteroskedasticity is tested using the Studentized Breusch–Pagan test. The null hypothesis establishes that residuals need to be homoscedastic because their variance should stay constant across all observations. The rejection of the null hypothesis shows that heteroskedasticity exists which causes standard error bias that makes all hypothesis testing procedures become ineffective. The test results provide strong evidence of heteroskedasticity in the regression residuals. The research solves this problem through the implementation of heteroskedasticity-robust standard errors which follow the empirical finance research best practices outlined by White (1980).

The Jarque–Bera test functions as the last method which checks for normal distribution in residuals. The requirement for normal residuals does not affect OLS estimator consistency in large samples but normality deviations can impact test statistic reliability. The analysis shows that residuals show non-normal distribution patterns which occur frequently when working with big firm-level data sets. The researchers use robust inference methods because the large sample size makes this violation non-critical.

The diagnostic tests show that the data contains autocorrelation and heteroskedasticity which requires the application of robust standard errors and GLS estimations. These procedures enhance the reliability of the regression results and ensure that statistical inference is robust to violations of classical regression assumptions.

## 4.5 Robustness Strategy and Alternative Specifications

The research uses various robustness techniques to validate the accuracy of its coefficient estimates because the diagnostic test results indicate both heteroskedasticity and autocorrelation. The evaluation of ESG data through empirical research needs to perform robustness checks because the study results become sensitive to different modeling techniques and data acquisition protocols and statistical processing methods. The research confirms ESG performance financial outcome relationships through multiple modeling techniques which employ different estimation methods and alternative model specifications.

The first robust strategy requires researchers to implement heteroskedasticity-robust standard error calculations. As the Breusch–Pagan test provides strong evidence of heteroskedasticity, conventional ordinary least squares (OLS) standard errors may be biased, leading to incorrect statistical inference. The study uses White (1980) robust standard error approach to solve this research problem. The method modifies the variance–covariance matrix of the estimators to perform valid hypothesis testing when error variance remains constant. Robust standard errors are applied to all baseline and pillar-level models to ensure consistency of inference.

The second robustness check investigates various methods to determine firm size. The baseline models use market capitalization as their size proxy because it shows how investors and the market view the company. However, market-based size measures may be endogenous to firm value and influenced by stock price fluctuations. The research uses total assets as an alternative size proxy to address this issue in its additional model specifications. Total assets in financial reports show company size through book values which do not react strongly to brief market fluctuations. The research investigates how the estimated ESG effects change when it uses total assets instead of market capitalization as its size measurement. The research results show identical results across these specifications which validate the strong base of the research findings.

The third robustness strategy requires researchers to use generalized least squares (GLS) estimation methods for their analysis. The Durbin–Watson test results which indicate positive autocorrelation show that OLS estimators will generate inefficient results. The GLS estimation

method handles serial correlation and heteroskedasticity in error structures which results in better parameter estimate efficiency. The research employs GLS models to study financial performance and firm value data while verifying that ESG coefficients retain their directional consistency and statistical significance when autocorrelation is properly addressed. The research follows previous panel data analyses which demonstrate that serial dependence in firm-level data requires GLS as a correction method (Wintoki, Linck, & Netter, 2012).

The research evaluates robustness through two methods which involve using aggregate ESG scores and separate pillar-level measures for model estimation. The study enables researchers to determine which ESG dimensions create the observed relationships instead of using the combined ESG score. The results become more credible when aggregate and pillar-level specifications show consistent results because this makes the results easier to understand.

The research study used multiple robust strategies to address three major econometric problems which researchers have identified in their studies. The research demonstrates ESG practices have financial effects on company value through its evidence which shows all analytical methods produce similar results.

## 4.6 Summary of the Methodological Approach

The chapter explains the process of data construction and presents methods for variable measurement and econometric model development and robustness check implementation to analyze ESG practices and their relationship with corporate financial results. The research uses systematic data collection methods which follow established corporate finance and sustainability studies protocols to obtain reliable results that can be replicated (Baltagi, 2005).

The research uses a big database which contains information about publicly traded non-financial companies that researchers studied throughout various time periods. The research benefits from panel data methodology because it enables researchers to manage unmeasured firm characteristics while analyzing both individual company differences and time-dependent changes (Wooldridge, 2010). The assessment of ESG performance includes both a total ESG score and separate environmental and social and governance ratings which come from a recognized ESG data source. Scientists can identify separate effects of different sustainability dimensions through ESG component separation according to research findings (Friede, Busch, & Bassen, 2015).

The assessment of corporate financial performance through two measurement approaches which use accounting data and market information. The return on equity metric shows short-term financial performance but the price-to-book ratio serves as a value indicator for companies. Research shows that accounting data needs to be combined with market-based indicators because sustainability practices create different impacts on financial performance during short timeframes and market value during long periods (Margolis & Walsh, 2003; Edmans, 2023).

The econometric framework consists of baseline regression models and pillar-level specifications and different size proxy methods which work together to perform a thorough analysis. The research includes firm size and leverage and liquidity as control variables to handle firm-specific characteristics which affect financial results according to empirical finance research conventions (McWilliams & Siegel, 2000). The diagnostic tests show that heteroskedasticity and autocorrelation exist in firm-level panel data which are typical characteristics of this data type (Gujarati & Porter, 2009).

The research solves these econometric problems using heteroskedasticity-robust standard errors together with generalized least squares estimation. The White (1980) method enables researchers to perform valid statistical analyses when their data contains non-constant error variance through its robust standard error calculation procedure. The GLS estimation method enhances efficiency because it directly handles serial correlation which exists in the error structure according to Baltagi (2005). The research design follows standard procedures in panel data research which strengthens the accuracy of the calculated coefficient values.

The research method used in this study establishes a strong scientific basis to study how ESG factors affect financial results. The research solves previous methodological problems through its combination of suitable data choice and specific variable definitions and powerful statistical analysis methods. The following section develops the existing framework through empirical data which results from the models that were previously specified.

## 4.7 Overview of Diagnostic Test Results

The following section presents results from diagnostic tests which evaluated both data quality and the accuracy of the econometric models used throughout this research. The following section shows test results which help determine the models and their impact on statistical inference methods. Empirical finance researchers must present diagnostic results as part of

their standard procedures because these results show if essential conditions are met and if additional analysis needs to be performed (Wooldridge, 2010).

Stationarity is first examined using the Augmented Dickey–Fuller (ADF) test. The ADF results indicate rejection of the null hypothesis of a unit root for all key variables, including return on equity, price-to-book ratio, ESG scores, and control variables. The research confirms that the studied variables maintain stationary patterns at their typical statistical significance thresholds. The analysis of stationarity helps researchers prevent incorrect spurious regression results which stem from shared trends instead of actual economic connections (Gujarati & Porter, 2009). The analysis of variable stationarity shows that panel regression methods can be used for future research.

The Variance Inflation Factor (VIF) serves as a tool which helps researchers measure the strength of relationships between independent variables that cause multicollinearity. The VIF values for ESG variables and control variables stay below accepted thresholds which shows that multicollinearity does not create a major problem. The low multicollinearity level between variables allows researchers to trust their coefficient estimates because the strong relationships between predictors do not cause artificial inflation of these values (Gujarati & Porter, 2009).

Autocorrelation in the residuals is examined using the Durbin–Watson test. The test results indicate the presence of positive autocorrelation in both the financial performance and firm value models. The main problem which occurs in firm-level panel data involves serial correlation because observations from the same firm throughout different time periods show statistical connection (Baltagi, 2005). The existence of autocorrelation indicates that ordinary least squares estimators produce inefficient results so researchers should apply generalized least squares estimation to achieve better parameter estimates (Durbin & Watson, 1950).

Heteroskedasticity is tested using the Studentized Breusch–Pagan test. The results provide strong evidence of heteroskedasticity, indicating that the variance of the error term differs across observations. Standard errors produce biased results when heteroskedasticity exists because it results in wrong hypothesis testing results unless researchers apply correction methods (Breusch & Pagan, 1979). The study uses heteroskedasticity-robust standard errors from White (1980) to solve this problem which enables proper statistical analysis.

Finally, residual normality is assessed using the Jarque–Bera test. The test results indicate deviations from normality in the residuals. Given the large sample size, this outcome is not unexpected and does not compromise the consistency of the estimators (Jarque & Bera, 1980).

Researchers can protect their results through robust inference methods which help them handle non-normal residual data to solve related research problems.

The diagnostic test results showed that classical regression assumptions were not met but researchers used appropriate econometric methods to make the required adjustments. The following chapter presents empirical results which stem from the combination of robust standard error analysis with GLS estimation methods to achieve methodological accuracy and statistical precision.

**Table 4.2: Summary of Diagnostic Test Results**

| **Test** | **Variable / Model** | **Test Statistic** | **p-value** | **Interpretation** |
|---|---|---|---|---|
| ADF | ROE | Significant | < 0.05 | Stationary |
| ADF | P2B | Significant | < 0.05 | Stationary |
| ADF | ESG | Significant | < 0.05 | Stationary |
| VIF | ESG & controls | < 2 | — | No multicollinearity |
| Durbin–Watson | ROE model | < 2 | < 0.05 | Positive autocorrelation |
| Durbin–Watson | P2B model | < 2 | < 0.05 | Positive autocorrelation |
| Breusch–Pagan | ROE model | Significant | < 0.05 | Heteroskedasticity present |
| Breusch–Pagan | P2B model | Significant | < 0.05 | Heteroskedasticity present |
| Jarque–Bera | Residuals | Significant | < 0.05 | Non-normal residuals |

# Chapter 5

# Empirical Results and Discussion

## 5.1 Descriptive Statistics and Correlation Analysis

The following section presents descriptive statistics together with correlation patterns which were used to analyze the empirical data. The following section aims to present a detailed analysis of ESG indicator distribution patterns together with financial performance metrics and firm attributes which will serve as the basis for regression model evaluation. The initial research method of empirical corporate finance requires researchers to conduct descriptive and correlation analyses because these approaches help them identify firm-specific patterns and abnormal data points and linkages between variables (Gujarati & Porter, 2009).

The descriptive statistics show that the ESG scores of the surveyed companies average at a high level which indicates most firms in the sample have implemented sustainability practices. The wide range of values relative to the mean shows that ESG engagement practices vary widely among organizations. The observed differences between firms demonstrate their actual business approaches together with their necessary regulatory compliance and their stakeholder demands. Organizations operating in visible industries which institutional investors monitor dedicate their resources to ESG practices, but other businesses only need to fulfill basic disclosure requirements (Ioannou & Serafeim, 2012).

The ESG pillars reveal that social aspects achieve the highest average rating which environmental aspects follow and governance aspects follow in order. The observed pattern follows the patterns which researchers have documented in their studies, and which businesses have demonstrated in their actual operations. Organizations select social programs which support employee welfare and workplace security and customer relations because these initiatives produce quick financial benefits through better employee performance and enhanced corporate reputation (Freeman, 1984). Environmental initiatives need large financial support and extended periods of time for completion, but governance reforms encounter institutional barriers when they try to make their changes (Jensen & Meckling, 1976).

The return on equity data shows wide-ranging values because the companies reported both negative and extremely high returns. The wide range of values between these numbers indicates

that companies achieve different levels of profitability because of their size and their position in specific industries and their debt levels and economic conditions. The actual financial results show that companies using high levels of debt will show elevated ROE during their successful years, yet their unprofitable businesses will generate negative ROE. The ROE data follows a non-normal distribution which shows high skewness and kurtosis values that researchers working with big firm-level data need to use advanced estimation methods for their future studies (Fama & French, 1992; Gujarati & Porter, 2009).

The price-to-book ratio shows wide-ranging values which follow a right-skewed distribution pattern. The market values only a few companies at levels higher than their recorded book value because investors predict fast growth and these companies possess valuable intellectual properties and dominate their markets. Firms which have low price-to-book ratios tend to operate in established markets or experience financial problems. Market expectations about future performance create greater value impact on firms than their current financial reports according to Edmans (2023).

The correlation analysis shows first indications about ESG performance connections to financial results and business attributes through its established linear patterns between variables. The ESG scores demonstrate no strong connection to ROE and price-to-book ratio which proves that sustainability performance does not directly impact financial outcomes based on standard bivariate analysis. Research findings from previous studies show conflicting results about how ESG practices affect corporate performance which indicates that ESG practices produce different results based on company characteristics and market conditions (Margolis & Walsh, 2003).

The data shows that ESG performance shows a stronger relationship with firm size indicators because bigger companies tend to achieve better ESG scores. The study demonstrates that big businesses must deal with rising government monitoring and media coverage through their expanded financial capabilities which they should use to support their sustainability initiatives (Ioannou & Serafeim, 2012). The ESG pillars show positive relationships with each other, but their correlation levels stay below what would indicate major multicollinearity problems which means these dimensions measure different yet connected corporate actions.

The descriptive statistics together with correlation analysis show that ESG performance and financial results of different companies exhibit major distinctions. The initial findings offer important background information, but they do not prove that any factors directly cause the

observed effects. Consequently, the following sections employ multivariate regression techniques to isolate the effect of ESG performance on corporate financial performance and firm value while controlling firm-specific characteristics.

**Table 5.1: Descriptive Statistics**

| Variable | Mean | SD | Median | Min | Max | Range | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|---|
| **ESG** | 69.01 | 13.09 | 70.94 | 25.29 | 93.3 | 68.02 | -0.68 | 0.26 |
| **E** | 68.84 | 17.67 | 73.34 | 0 | 98.55 | 98.55 | -1.07 | 1.13 |
| **S** | 72.59 | 16.04 | 75.4 | 19.98 | 98.14 | 78.16 | -0.63 | -0.21 |
| **G** | 63.87 | 19.59 | 66.58 | 10.77 | 97.89 | 87.12 | -0.39 | -0.8 |
| **ROE** | 30.23 | 34.4 | 24.96 | -121.37 | 506.26 | 627.64 | 4.72 | 50.87 |
| **P2B** | 8.13 | 16.72 | 4.75 | 0.32 | 267.86 | 267.55 | 11.13 | 151.8 |

**Interpretation of Table 5.1**

The mean value of the overall ESG score is 69.01, with a median value of 70.94. The environmental pillar contains the lowest ESG component values which amount to 68.84 on average and 73.34 in median while the social pillar contains the highest values which amount to 72.59 on average and 75.40 in median. The governance pillar has a comparatively lower mean value of 63.87 and a median of 66.58. For all ESG-related variables, the median values exceed the corresponding mean values.

The ESG score shows a standard deviation of 13.09 which indicates that companies have scores that vary at a moderate level. The sustainability performance of firms shows significant variation because their environmental social and governance pillars have standard deviations of 17.67, 16.04 and 19.59. The ranges demonstrate how values spread out because ESG values range from 25.29 to 93.30 and environmental scores range from 0 to 98.55 and social scores range from 19.98 to 98.14 and governance scores range from 10.77 to 97.89.

The financial performance data shows that ROE values range from 30.23 to 24.96 with 30.23 being the average and 24.96 being the middle value. The ROE data shows wide variations because the standard deviation reaches 34.40 while the values extend from −121.37 to 506.26. This refers to the existence of both firms with negative shareholder returns and firms with exceptionally high profitability.

The average ESG scores show moderate levels but the wide range of scores indicates that most companies have implemented sustainability practices, yet their ESG integration levels differ substantially. Research by Friede, Busch and Bassen (2015) show that ESG engagement levels

between different companies remain different because their available resources and business objectives create varying levels of ESG adoption.

**Table 5.2: Correlation Matrix (ROE)**

| | ROE | ESG | E | S | G | MktCap | TA | CR | DtPer |
|---|---|---|---|---|---|---|---|---|---|
| **ROE** | 1 | 0.048 | 0.078 | 0.069 | -0.038 | 0.166 | -0.02 | -0.044 | 0.304 |
| **ESG** | 0.048 | 1 | 0.738 | 0.829 | 0.594 | 0.205 | 0.315 | -0.061 | -0.03 |
| **E** | 0.078 | 0.738 | 1 | 0.576 | 0.122 | 0.104 | 0.233 | -0.107 | 0.015 |
| **S** | 0.069 | 0.829 | 0.576 | 1 | 0.193 | 0.156 | 0.237 | -0.018 | 0.027 |
| **G** | -0.038 | 0.594 | 0.122 | 0.193 | 1 | 0.198 | 0.259 | -0.003 | -0.076 |
| **MktCap** | 0.166 | 0.205 | 0.104 | 0.156 | 0.198 | 1 | 0.665 | 0.041 | -0.015 |
| **TA** | -0.02 | 0.315 | 0.233 | 0.237 | 0.259 | 0.665 | 1 | -0.095 | 0.003 |
| **CR** | -0.044 | -0.061 | -0.107 | -0.018 | -0.003 | 0.041 | -0.095 | 1 | -0.134 |
| **DtPer** | 0.304 | -0.03 | 0.015 | 0.027 | -0.076 | -0.015 | 0.003 | -0.134 | 1 |

**Interpretation of Table 5.2**

The Return on Equity (ROE) metric shows a minimal positive relationship with the complete ESG score because its correlation coefficient amounts to 0.048. The research on ESG components shows ROE has a positive relationship with environmental factors at 0.078 and social elements at 0.069 yet shows a small negative link with governance aspects at -0.038.

The ROE metric shows a weak positive relationship with market capitalization because its 0.166 coefficient indicates this relationship. In contrast, the correlation between ROE and total assets is slightly negative at −0.02. ROE is also weakly negatively correlated with the current ratio (−0.044), while it shows a relatively stronger positive correlation with the debt-to-equity ratio, with a coefficient of 0.304.

The ESG metrics show no significant relationship with ROE which indicates that business performance will experience sustainability initiative effects during long-term periods instead of generating short-term financial gains. Research findings indicate ESG engagement does not produce meaningful short-term financial returns because ESG investments need multiple years to reach their expected financial performance (Margolis & Walsh, 2003).

The overall ESG score is strongly correlated with its individual components. ESG shows a high positive correlation with the environmental pillar (0.738) and an even stronger correlation with the social pillar (0.829). The correlation between ESG and the governance pillar is also positive at 0.594. The values demonstrate that the aggregate ESG score maintains its connection to all its individual components.

Among the ESG pillars, the environmental and social pillars are moderately correlated with each other (0.576). The governance pillar demonstrates poor linkage between its performance indicators and environmental (0.122) and social (0.193) metrics. The market capitalization data shows positive relationships with ESG (0.205) and all three ESG components which produce coefficients between 0.104 and 0.198.

The research shows that ESG (0.315) and all three ESG pillars (0.233 environmental, 0.237 social and 0.259 governance) have positive relationships with total assets. The two variables demonstrate a powerful positive connection between total assets and market capitalization at 0.665. The remaining control variables show mostly weak relationships with both the ESG variables and ROE.

**Table 5.3: Correlation Matrix (P2B)**

| | P2B | ESG | E | S | G | MktCap | TA | CR | DtPer |
|---|---|---|---|---|---|---|---|---|---|
| **P2B** | 1 | -0.057 | -0.002 | -0.004 | -0.102 | 0.153 | -0.003 | -0.05 | 0.881 |
| **ESG** | -0.057 | 1 | 0.738 | 0.829 | 0.594 | 0.205 | 0.315 | -0.061 | -0.03 |
| **E** | -0.002 | 0.738 | 1 | 0.576 | 0.122 | 0.104 | 0.233 | -0.107 | 0.015 |
| **S** | -0.004 | 0.829 | 0.576 | 1 | 0.193 | 0.156 | 0.237 | -0.018 | 0.027 |
| **G** | -0.102 | 0.594 | 0.122 | 0.193 | 1 | 0.198 | 0.259 | -0.003 | -0.076 |
| **MktCap** | 0.153 | 0.205 | 0.104 | 0.156 | 0.198 | 1 | 0.665 | 0.041 | -0.015 |
| **TA** | -0.003 | 0.315 | 0.233 | 0.237 | 0.259 | 0.665 | 1 | -0.095 | 0.003 |
| **CR** | -0.05 | -0.061 | -0.107 | -0.018 | -0.003 | 0.041 | -0.095 | 1 | -0.134 |
| **DtPer** | 0.881 | -0.03 | 0.015 | 0.027 | -0.076 | -0.015 | 0.003 | -0.134 | 1 |

**Interpretation of Table 5.3**

The price-to-book ratio (P2B) shows a weak negative relationship with the total ESG score because its coefficient equals −0.057. The ESG components of P2B show weak relationships with environmental (−0.002) and social (−0.004) factors but demonstrate a slightly stronger negative connection with governance (−0.102).

The market capitalization data shows a positive relationship with P2B at a coefficient value of 0.153. The total assets and current ratio metrics show near zero correlation with this metric because their correlation values are −0.003 and −0.05 respectively. A very strong positive correlation is observed between P2B and the debt-to-equity ratio, with a coefficient of 0.881.

The ESG measures demonstrate minimal relationship with firm value which suggests that sustainability performance does not create direct effects on market-based valuation metrics. Research studies have shown that ESG engagement produces conflicting results which result in minimal positive effects on company value according to Friede Busch and Bassen (2015).

The ESG score shows a strong relationship with its three separate elements because it has positive correlations of 0.738 with environmental factors and 0.829 with social elements and 0.594 with governance aspects. The values show that the aggregate ESG measure maintains a strong connection with its individual components.

The environmental and social pillars of ESG components show a 0.576 level of positive correlation which is moderate in strength. The governance pillar contains few performance indicators which do not connect to environmental (0.122) and social (0.193) metrics. Market capitalization is positively correlated with ESG (0.205) and with all ESG pillars, with correlation coefficients ranging from 0.104 to 0.198.

The ESG score shows a positive relationship with total assets at 0.315 while the environmental pillar shows a 0.233 correlation and social pillar shows a 0.237 correlation and governance pillar shows a 0.259 correlation. The data demonstrates a powerful positive connection between market capitalization and total assets because the correlation coefficient reaches 0.665. The remaining control variables show no significant relationship between ESG components and P2B.

## 5.2 ESG and Corporate Financial Performance: Evidence from ROE Regressions

The section investigates how ESG performance affects corporate financial results through an analysis of return on equity (ROE) as the outcome measure. The corporate finance literature uses ROE as an accounting-based profitability measure which shows how well companies produce shareholder returns from their total equity (Fama & French, 1992). The research uses a sequential method which begins with a basic model before introducing control elements and multiple model types to confirm the experimental results.

The baseline regression model shows that ESG performance has a positive relationship with ROE which is statistically significant. The research indicates that businesses which achieve better ESG performance ratings will show better financial performance, yet the strength of this relationship remains limited. The research findings align with stakeholder theory which demonstrates that organizations which handle their relationships with staff members and their customers and regulatory bodies and community stakeholders will obtain better operational results (Freeman, 1984). Organizations that maintain strong ESG practices throughout their operations will achieve lower employee turnover and better corporate reputation and operational stability which results in improved financial performance.

When firm-specific control variables are introduced in the main regression model, the coefficient on ESG remains positive but decreases in magnitude. The decrease in the model indicates that certain firm characteristics explain part of the relationship which existed in the baseline model instead of ESG performance being the sole cause. The research shows that market capitalization which serves as a firm size indicator creates a positive relationship with ROE that produces strong statistical significance. The size of firms creates advantages because they can achieve better scale efficiency and gain stronger negotiation abilities and simpler funding opportunities which lead to higher profit margins (Fama & French, 1992). Large firms have better capabilities to handle ESG investment expenses which include both compliance costs and sustainability reporting expenses.

The debt percentage which represents leverage shows a positive relationship with ROE that is both statistically significant. The results demonstrate the leverage effect which shows that debt financing enables firms to boost equity returns when their operating performance produces positive results. Companies which use debt strategically can achieve better shareholder value while they pursue their ESG sustainability goals. The ownership-control structure creates

financial risks because businesses that use debt for operational funding will experience long-term stability problems when their debt management reaches an uncontrolled state (Jensen & Meckling, 1976).

Research findings show that the current ratio which indicates liquidity does not align with ROE because scientists examine different business elements. The research shows that short-term liquidity conditions fail to explain why different firms in the sample produce varying levels of profitability. The practice of holding surplus liquidity does not automatically lead to better business performance because big companies which already have market access to capital do not experience direct profitability benefits.

The research evaluates stability through a different model which uses total assets instead of market capitalization to measure company dimensions. The ESG coefficient shows increased strength in this robustness model while maintaining its statistical significance. The research shows that ESG performance leads to better financial outcomes, but market-based size effects do not affect these results. The company monitors its productive resources through total assets which demonstrate how sustainability practices enhance resource management operational efficiency. The combination of energy efficiency investments with labor practice enhancements will result in decreased operational costs and enhanced asset performance during the long term.

The ROE regression results show that ESG performance creates a small positive connection with corporate profitability. Research studies show ESG engagement produces financial benefits which prove to be small rather than substantial according to Margolis & Walsh (2003) and Friede et al. (2015). Importantly, the results suggest that ESG practices should not be viewed as a short-term profit maximization strategy. The research indicates that ESG engagement operates as an additional system which strengthens business stability and operational performance to generate enduring financial success (Edmans, 2023).

The research results show that scientists must conduct additional research to determine which ESG elements create the observed connection. The following section analyzes ESG performance through its environmental and social and governance elements to determine how these components affect corporate financial results.

**Table 5.4: Baseline Regression – ESG and ROE**

| Variable | Estimate | Std. Error | Significance |
|---|---|---|---|
| Intercept | 21.465 | 1.831 | *** |
| ESG | 0.127 | 0.026 | *** |

**Model Statistics:**

| R-squared | Adj. R-squared | Residual Std. Error | F-statistic | Observations |
|---|---|---|---|---|
| 0.00233 | 0.00224 | 34.36 | 23.75 *** | 10152 |

**Interpretation of Table 5.4**

Looking at the starting numbers, higher ESG ratings link to stronger returns on equity. A value of 0.127 appears for ESG, with a margin of error set at 0.026. This result lands clearly outside random chance, showing up three times with an asterisk - strong evidence it's real. When ESG goes up, so does ROE, at least in this first look.

At zero ESG, predicted ROE stands at 21.465, with a margin of error around 1.831 points. That estimate holds up well when tested against small probabilities. When results this tight show up, they usually matter - here, that pattern repeats at the 1 percent level. So, if environmental metrics vanish in theory, this number captures what happens.

When it comes to how well the model works, the regression shows only 0.23% of ROE's change explained by ESG - original figure being 0.00233, adjusted version at 0.00224. Around the predicted line, the leftover variation spread widely, measured via residual standard error at 34.36.

Stronger ESG efforts might tie to better financial results because companies with solid sustainability habits often run more smoothly day to day. Better ties to investors, customers, or workers could also help explain higher earnings reports. Earlier research found similar links - though weak in size - between environmental and social actions and market outcomes (Friede, Busch, & Bassen, 2015).

A value of 23.75 for the F-statistic stands out when tested against a 1% threshold, making it clear the entire model has real statistical weight. With data drawn from 10,151 cases, the foundation for analysis is solid through ample observation points.

**Table 5.5: Main Regression Model – ESG, Controls, and ROE**

| Variable | Estimate | Std. Error | Significance |
|---|---|---|---|
| Intercept | 19.54 | 1.872 | *** |
| ESG | 0.0597 | 0.0251 | * |
| MktCap | 1.69E-11 | 9.65E-13 | *** |
| DtPer | 0.0337 | 0.00103 | *** |
| CR | -0.2693 | 0.318 | |

**Model Statistics:**

| R-squared | Adj. R-squared | Residual Std. Error | F-statistic | Observations |
|---|---|---|---|---|
| 0.1224 | 0.1221 | 32.23 | 353.9 *** | 10152 |

**Interpretation of Table 5.5**

Looking at the key findings, there's clear evidence that higher ESG ratings link to stronger returns on equity. This connection shows up through an estimate of 0.0597, where uncertainty adds a layer of 0.0251. Although small, this result holds steady when tested against random chance - just enough to register at the 10 percent mark, marked with a faint star.

A small but clearly nonzero effect appears for market capitalization, valued at 1.69E−11, shown with reliability down to 9.65E−13, holding firm to a p-value below 1 percent. When it comes to debt per equity, the link with return on equity leans forward similarly - coming in around 0.0337 while held steady by an error term of 0.00103, pointing definitely toward significance in that range. Meanwhile, the current ratio dips into negative territory by way of its calculated value (−0.2693); yet, without enough data-driven support behind it, that result simply doesn't make the cut past null.

Even after adjusting for company size and funding type, a steady positive ESG score hints that sustainability efforts link to earnings in ways outside just scale or funding. Earlier studies show such links often hold but weaken in strength when real-world firm traits are factored in (Friede, Busch, & Bassen, 2015).

A value of 19.54 sits at the intercept, marked by a standard error of 1.872, while showing statistical importance at the 1 percent level. When each explanatory factor lines up exactly with zero, this is what you'd predict for ROE.

When it comes to how well the model works, the R-squared at 0.1224 shows a modest share of ROE's changes covered - this improves slightly to 0.1221 after adjusting for complexity. Around the predicted line, leftover variation spreads widely, measured by a residual standard error of 32.23.

With a value of 353.9, the F-statistic stands out clearly under a 1% threshold, making it impossible to ignore the joint impact within the system. Running through data points - exactly 10,152 of them - helped shape this analysis.

**Table 5.6: Robustness Model – ESG and ROE (Alternative Size Measure)**

| Variable | Estimate | Std. Error | Significance |
|---|---|---|---|
| Intercept | 14.25 | 1.899 | *** |
| ESG | 0.1863 | 0.02615 | *** |
| TA | -1.78E-11 | 4.10E-12 | *** |
| DtPer | 0.03371 | 0.001048 | *** |
| CR | -0.07842 | 0.323 | |

**Model Statistics:**

| R-squared | Adj. R-squared | Residual Std. Error | F-statistic | Observations |
|---|---|---|---|---|
| 0.09763 | 0.09728 | 32.68 | 274.5 *** | 10152 |

**Interpretation of Table 5.6**

The ESG score shows a positive relationship with return on equity (ROE) based on robustness regression results which use total assets as the firm size indicator. The estimated coefficient for ESG is 0.1863 with a standard error of 0.02615, and the coefficient is statistically significant at the 1% level, as indicated by the three asterisks.

The Total assets variable shows a statistically significant negative relationship with a coefficient value of −1.78E−11 and a standard error of 4.10E−12 at the 1% significance level. The debt-to-equity ratio produces positive results with ROE which generate statistically significant findings at a 1% significance level with an estimated coefficient of 0.03371 and a standard error of 0.001048. The current ratio shows a negative coefficient of −0.07842 but this value does not reach statistical significance.

The ESG–ROE relationship shows no change in its positive and statistically significant pattern when researchers substitute total assets for market capitalization as their firm size metric. Research findings indicate that ESG-performance relationships persist when researchers employ multiple analytical methods to determine company size (Friede, Busch, & Bassen, 2015).

The intercept term has an estimated value of 14.25 with a standard error of 1.899 and is statistically significant at the 1% level. The model produces this ROE value when all input variables stay at their default settings which are set to zero.

In terms of model fit, the R-squared value is 0.09763, while the adjusted R-squared value is 0.09728. These values indicate that the model explains a moderate proportion of the variation in ROE. The residual standard error is 32.68, reflecting the dispersion of the residuals around the fitted values.

The F-statistic of 274.5 is statistically significant at the 1% level, indicating that the robustness model is jointly significant. The regression is estimated using 10,152 observations.

**Overall Interpretation of ROE Results**

The ROE regression results show ESG performance has a small positive connection to corporate profitability. The research shows that organizations which implement ESG practices will achieve financial success, but these practices will not produce direct financial benefits at first. The research shows that ESG engagement works together with firm size and capital structure and operational efficiency to boost profitability. Previous research studies demonstrate that ESG financial benefits appear under conditions while they develop slowly (Margolis & Walsh, 2003; Friede, Busch, & Bassen, 2015).

## 5.3 Pillar-Level ESG Effects on Corporate Financial Performance (ROE)

The following section builds upon the fundamental ESG assessment by breaking down the total ESG score into its three components which include environmental (E) and social (S) and governance (G) factors to study how specific sustainability elements affect corporate value through price-to-book (P2B) ratio performance. The evaluation of ESG components requires separate analysis of its individual elements because different sustainability aspects affect company value through distinct mechanisms which become inaccessible when ESG data is merged into a single index. Research studies show that ESG indicators which combine multiple

factors do not show the same effects when studied through their individual components (Friede, Busch, & Bassen, 2015).

The regression results show that P2B has a positive and statistically significant connection with the environmental pillar. The market shows higher value for companies which achieve better environmental results. Real economic data shows that environmental programs which improve energy efficiency and decrease emissions and promote sustainable resource use will lead to better long-term financial performance while minimizing environmental and regulatory expenses. The market value of stocks includes these elements which result in stock prices that exceed book value. The research results validate the Porter Hypothesis because this theory shows organizations can improve their market standing through environmental programs which generate business worth (Porter & van der Linde, 1995).

The social pillar fails to establish any statistically meaningful connection between its elements and the P2B value assessment of firms. The market value of companies does not seem to reflect their social initiatives which include employee welfare programs and diverse policies and community outreach programs. The practices help stakeholders trust the organization while making the company more resilient, but they produce financial advantages which become visible only after a long period of time. Organizations use social performance to reduce their risks and achieve long-term financial stability instead of influencing their present market value multiples according to Edmans (2011) and Freeman (1984).

The governance pillar shows a negative relationship with P2B which is statistically significant. The research indicates that better governance systems lead to decreased market value during the first few months of operation. The establishment of enhanced governance systems which include board oversight and compliance systems and internal control mechanisms would limit management ability to execute dangerous expansion strategies which could generate short-term market-based profits. The governance system which Agency theory created protects staff members from misconduct, yet it restricts managerial autonomy which produces adverse effects on short-term stock market performance (Jensen & Meckling, 1976). The negative connection between these elements does not indicate value reduction because it demonstrates how short-term market value fluctuations impact long-term financial stability.

The control variables in the study show that market capitalization creates a positive relationship with P2B which indicates that bigger companies achieve better market value because they have

larger size and stronger market position and better capital market access (Fama & French, 1992). The research demonstrates that leverage generates positive value for businesses which confirms the debt financing theory that debt financing benefits shareholders through tax advantages and enhanced capital structure management. The data shows no statistical connection between P2B and liquidity, which indicates that short-term financial stability does not affect market value assessment in this research sample.

The evaluation of ESG elements at their respective pillars shows that these factors affect company value through distinct business operations. The market shows positive pricing for environmental performance, yet governance practices generate short-term valuation expenses and social performance does not affect P2B directly. The research shows that investors need to evaluate ESG elements independently because using combined scores leads to wrong conclusions. The single construct method of ESG analysis fails to detect how different sustainability elements create distinct effects which influence how firms value in the market.

**Table 5.7 Coefficients Table: Individual Pillar**

| Variable | Estimate | Std. Error | Significance |
|---|---|---|---|
| Intercept | 20.68 | 1.886 | *** |
| E | 0.105 | 0.022 | *** |
| S | 0.028 | 0.025 | |
| G | -0.103 | 0.017 | *** |
| MktCap | 1.77E-11 | 9.67E-13 | *** |
| DtPer | 0.03309 | 0.001034 | *** |
| CR | -0.155 | 0.319 | |

**Model statistics:**

| R-squared | Adj. R-squared | Residual Std. Error | F-statistic | Observations |
|---|---|---|---|---|
| 0.1282 | 0.1276 | 32.13 | 248.6 *** | 10152 |

**Interpretation of Table 5.7**

The regression analysis in Table 5.7 investigates how each environmental (E) and social (S) and governance (G) pillar affects firm profitability through return on equity (ROE) measurements. The research findings demonstrate that ESG components affect corporate financial performance by operating through separate mechanisms.

The environmental pillar (E) shows a positive connection with ROE which produces both statistically significant and relevant results. The estimated coefficient for E is 0.105 with a

standard error of 0.022, and the coefficient is statistically significant at the 1% level, as indicated by the three asterisks. Research shows that organizations which reach the highest levels of environmental performance will generate superior financial performance. Organizations that dedicate resources to energy efficiency and
The average ESG scores show moderate levels but the wide range of scores indicates that most companies have implemented sustainability practices, yet their ESG integration levels differ substantially. Research by Friede, Busch and Bassen (2015) show that ESG engagement levels between different companies remain different because their available resources and business objectives create varying levels of ESG adoption.

emissions reduction and sustainable resource management will achieve lower operational expenses and decreased regulatory exposure which will result in better profitability during upcoming years. Research conducted before this study shows that environmental initiatives within ESG dimensions create the strongest link between sustainability initiatives and better financial reporting results (Porter & van der Linde, 1995; Friede, Busch, & Bassen, 2015).

The social pillar (S) shows a positive coefficient of 0.028 but this relationship fails to reach statistical significance. The data indicates that social performance does not produce any short-term impact on ROE. Organizations which allocate funds to employee welfare programs and training initiatives and workplace safety and diversity programs will achieve lasting business benefits because these programs lead to better employee performance and improved corporate reputation while maintaining business operations despite their lack of immediate financial value. Research data shows that social initiatives produce effects on company value and risk management performance, but they do not affect current profit levels (Edmans, 2011; Freeman, 1984).

The governance pillar (G) produces negative results which show both statistical significance and negative values. The standard error of the estimated coefficient −0.103 equals 0.017 while the coefficient remains statistically significant at the 1% level. The research indicates that better governance systems will produce lower short-term financial performance. The implementation of real-world governance systems which include board oversight and compliance systems and internal controls results in elevated monitoring costs and restricted managerial freedom to operate. The trade-off between governance mechanisms and managerial opportunism exists because Agency theory shows these mechanisms protect shareholders but restrict their ability

to pursue aggressive profit-maximization strategies which results in reduced short-term returns (Jensen & Meckling, 1976).

Real-world businesses that implement environmental sustainability practices achieve operational efficiency but their social programs for employee welfare and their governance systems which provide better monitoring and investor trust building will generate long-term productivity benefits. The short-term operation of these channels shows distinct patterns. The research conducted prior to this study showed that environmental and governance improvements directly boost financial performance, yet social investments generate value through sustained periods (Porter & van der Linde, 1995; Edmans, 2011; Jensen & Meckling, 1976).

The intercept term shows an estimated value of 20.68 with a standard error of 1.886 which proves statistically significant at the 1% level to indicate ROE expectations when all variables equal zero. The R-squared value in this model reaches 0.1282 while the adjusted R-squared value reaches 0.1276 which shows that the model effectively explains ROE variations. The residual standard error of 32.13 reflects the dispersion of the residuals around the fitted values. The F-statistics of 248.6 are statistically significant at the 1% level, confirming that the model is jointly significant based on 10,152 observations.

The research findings show that ESG elements produce separate effects which determine how well companies perform financially. The financial performance of the environment leads to positive effects on ROE, but social performance does not generate any direct financial benefits and governance practices require companies to make immediate decisions about their expenses. The research findings indicate that researchers need to analyze ESG pillars separately because ESG metrics combined as a single unit conceal the distinct financial routes which sustainability elements affect corporate performance.

Overall Interpretation of Pillar-Level ROE Results

The research results from each pillar demonstrate that environmental factors in ESG performance led to better profitability but governance standards require immediate expenses and social criteria do not impact short-term performance. The research demonstrates that ESG components need separate analysis because using ESG as a single entity hides the distinct financial effects which different sustainability factors produce.

## 5.4 ESG and Firm Value: Evidence from Price-to-Book Ratio Regressions

The research investigates how ESG performance affects company value through its impact on the price-to-book (P2B) ratio which serves as the study's dependent variable. The price-to-book ratio shows market predictions about upcoming business expansion and risk levels and non-tangible assets through its mathematical process, yet ROE works with financial data from accounting records. The field of empirical finance applies P2B as a predictive method to estimate future company worth through models which Fama & French (1992) and Edmans (2023) developed. Financial markets use ESG effect analysis to determine how sustainability practices affect the value of their firms.

The baseline regression results show that ESG performance at the aggregate level has a negative relationship with the price-to-book ratio which is statistically significant. The research indicates that companies which achieve better ESG performance ratings will show decreased market value performance compared to their book value during the initial period. The present market information indicates that investors doubt ESG initiatives because they believe these initiatives will lead to higher business expenses and take away essential management focus from fundamental profit-driven operations. The market value of companies that focus on ESG initiatives decreases because investors doubt the financial advantages of these initiatives which they predict will only become evident after multiple years (Margolis & Walsh, 2003).

The main regression model shows that firm-specific control variables do not affect the negative ESG coefficient which maintains its statistical significance while becoming slightly more pronounced. The ongoing relationship between ESG performance and firm value shows that these two factors do not have a negative connection because of firm size or leverage or liquidity. The price-to-book ratio shows a positive relationship with market capitalization because investors boost their stock value estimates when companies reach higher market value. The market power of larger firms together with their diverse business activities and better capital market access leads to higher valuation multiples according to Fama & French (1992).

The debt percentage which represents leverage demonstrates a strong positive relationship with firm value. The market appears to view companies using higher levels of debt for their business expansion and capital structure optimization efforts. Business operations that use moderate leverage create a positive investor signal because management demonstrates its belief in future growth which investors then value through higher stock prices. The current ratio which

functions as a liquidity indicator demonstrates a statistically significant positive connection with firm value because markets tend to favor businesses which sustain superior short-term financial stability.

The robust assessment uses an alternative model which determines firm size through total assets instead of market capitalization. The ESG coefficient in this robust model shows a negative value which remains statistically significant, but its absolute value becomes smaller. This finding indicates that the negative valuation effect of ESG performance is robust to alternative size proxies but may be partially influenced by how firm scale is measured. The book value of productive resources appears in total assets, but market capitalization shows what investors predict about the company. The distinction between accounting-based firm characteristics and market-based firm characteristics becomes essential because of this difference.

The P2B regression results show that current financial markets use market reactions to punish ESG engagement through immediate market responses which strengthen when sustainability costs appear, but sustainability advantages remain unknown. Research shows that ESG investments result in short-term value decreases, but they develop both organizational power and risk management capabilities throughout long-term periods (Edmans, 2023; Friede, Busch, & Bassen, 2015). Investors require financial evidence that demonstrates ESG practices before they adopt sustainability performance as their complete company valuation method.

The research results show that accounting performance metrics operate independently from market value assessments which investors apply to assess company performance. ESG practices show some evidence of supporting business profitability, but markets tend to view them negatively during the first few years of implementation. The following section expands this research by studying how ESG factors at the pillar level affect company value which leads to a better comprehension of how environmental and social and governance elements affect market stock prices.

**Table 5.8: Baseline Regression – ESG and Firm Value (P2B)**

| Variable | Estimate | Std. Error | Significance |
|---|---|---|---|
| Intercept | 13.18 | 0.889 | *** |
| ESG | -0.073 | 0.013 | *** |

**Model Statistics:**

| R-squared | Adj. R-squared | Residual Std. Error | F-statistic | Observations |
|---|---|---|---|---|
| 0.0033 | 0.0032 | 16.69 | 33.41 *** | 10,152 |

**Interpretation of Table 5.8**

The baseline regression results show that ESG scores have a negative impact on firm value which we measure through the price-to-book ratio (P2B). The ESG coefficient estimate equals -0.073 while its standard error amounts to 0.013 and the coefficient reaches statistical significance at the 1% level based on three asterisks.

The negative relationship between ESG performance and price-to-book ratio indicates that companies with better ESG scores must spend money on environmental and social compliance and investment activities which do not lead to immediate market value appreciation. Research findings show that ESG investments produce long-term value changes because market advantages emerge through time rather than affecting current market evaluations (Friede, Busch, & Bassen, 2015).

The intercept term has an estimated value of 13.18 with a standard error of 0.889 and is statistically significant at the 1% level. The P2B value will reach its expected worth at the point when the ESG score becomes zero.

In terms of model fit, the R-squared value is 0.0033, while the adjusted R-squared is 0.0032, indicating that a small proportion of the variation in P2B is explained by ESG in the baseline specification. The residual standard error of the model is 16.69, reflecting the dispersion of the residuals around the fitted values.

The F-statistics of 33.41 is statistically significant at the 1% level, indicating that the model as a whole is statistically significant. The regression is estimated using 10,152 observations.

**Table 5.9: Main Regression Model – ESG, Controls, and Firm Value (P2B)**

| Variable | Estimate | Std. Error | Significance |
|---|---|---|---|
| Intercept | 4.486 | 0.423 | *** |
| ESG | -0.081 | 0.006 | *** |
| MktCap | 8.68E-12 | 2.18E-13 | *** |
| DtPer | 0.0475 | 0.00023 | *** |
| CR | 0.953 | 0.0718 | *** |

**Model Statistics:**

| R-squared | Adj. R-squared | Residual Std. Error | F-statistic | Observations |
|---|---|---|---|---|
| 0.8105 | 0.8104 | 7.279 | 10850 *** | 10,152 |

**Interpretation of Table 5.9**

The main regression results indicate a negative relationship between the ESG score and firm value measured by the price-to-book ratio (P2B) after controlling for firm-specific factors. The ESG coefficient shows a statistically significant negative value of -0.081 with a standard error of 0.006 at the 1% significance level.

The ESG performance shows a continuous negative connection with the price-to-book ratio even when researchers use firm characteristics for their analysis which indicates markets view ESG investments as immediate expenses that decrease current market value although these investments might generate future advantages. Research data indicates that financial markets first fail to recognize the worth of ESG initiatives until investors see sustainability results which lead to increased value of these investments (Friede, Busch, & Bassen, 2015).

The market capitalization variable produces a statistically significant positive coefficient which equals 8.68E−12 while its standard error amounts to 2.18E−13 at a 1% significance level. The debt-to-equity ratio shows a positive connection with P2B, which is statistically significant at a 1% level with an estimated coefficient of 0.0475 and a standard error of 0.00023. The current ratio shows a positive relationship with its coefficient at 0.953, which has a standard error of 0.0718 and achieves statistical significance at the 1% level.

The interception term has an estimated value of 4.486 with a standard error of 0.423 and is statistically significant at the 1% level. The model predicts this value for firm worth when all input variables have their base values of zero.

In terms of model fit, the R-squared value of 0.8105 and the adjusted R-squared value of 0.8104 indicate that a large proportion of the variation in P2B is explained by the model. The residual standard error is 7.279, reflecting the dispersion of the residuals around the fitted values.

The F-statistic of 10,850 are statistically significant at the 1% level, indicating that the model is jointly significant. The regression is estimated using 10,152 observations.

**Table 5.10: Robustness Model – ESG and Firm Value (Alternative Size Measure)**

**Robust Variable Model**

| Variable | Estimate | Std. Error | Significance |
|---|---|---|---|
| Intercept | 2.446 | 0.455 | *** |
| ESG | -0.0386 | 0.0063 | *** |
| TA | 2.18E-12 | 9.81E-13 | * |
| DtPer | 0.0475 | 0.00025 | *** |
| CR | 1.122 | 0.0773 | *** |

**Model Statistics:**

| R-squared | Adj. R-squared | Residual Std. Error | F-statistic | Observations |
|---|---|---|---|---|
| 0.781 | 0.7809 | 7.825 | 9044 *** | 10,152 |

**Interpretation of Table 5.10**

From the robust variable regression results, the ESG score exhibits a negative and statistically significant relationship with firm value measured by the price-to-book ratio (P2B). The ESG coefficient shows a statistically significant value of -0.0386 with a standard error of 0.0063 at the 1% significance level.

Research findings show that ESG investments lead to negative market value decreases which maintain statistical significance when researchers base their firm size calculations on total assets. Research data indicates that financial markets decrease ESG initiative values before sustainability results emerge which results in market value expansion (Friede, Busch, & Bassen, 2015).

The statistical analysis shows that Total assets have a positive coefficient of 2.18E−12 with a standard error of 9.81E−13 which reaches statistical significance at the 10% level. The debt-to-equity ratio shows a positive relationship with the dependent variable because its coefficient value is 0.0475 while its standard error is 0.00025 and the result is statistically significant at a 1% level. The current ratio shows a positive relationship with its coefficient value at 1.122 which has a standard error of 0.0773 and achieves statistical significance at the 1% level.

The intercept term has an estimated value of 2.446 with a standard error of 0.455 and is statistically significant at the 1% level. The model predicts this value for firm worth when all input variables have their base values of zero.

In terms of model fit, the R-squared value is 0.781, while the adjusted R-squared value is 0.7809, indicating that a large proportion of the variation in P2B is explained by the model. The residual standard error is 7.825, reflecting the dispersion of the residuals around the fitted values.

The F-statistics of 9,044 are statistically significant at the 1% level, indicating that the robustness model is jointly significant. The regression is estimated using 10,152 observations.

**Overall Interpretation of P2B Results**

The P2B regression results show that ESG performance has a negative relationship with firm value during the short-term period. The research shows that financial markets will penalize businesses which adopt ESG initiatives because these sustainability projects need immediate costs without providing any immediate evidence of their positive effects. The short-term valuation discount does not prove that ESG practices will create value destruction during future periods. The data shows that investors remain skeptical about ESG financial performance measurement capabilities during this present period (Edmans, 2023).

## 5.5 Pillar-Level ESG Effects on Firm Value (Price-to-Book Ratio)

The following section breaks down the total ESG score into its three environmental and social and governance elements to study which sustainability factors affect market value. Organizations need to analyze ESG factors through pillar-based assessment because price-to-book ratio serves as their market-based value measurement and investors show distinct reactions to different sustainability indicators. Research conducted earlier shows that financial markets use different methods to value ESG elements and ESG scores which combine multiple factors do not show equal weight to each dimension (Friede, Busch, & Bassen, 2015).

The regression results demonstrate that the environmental pillar does not create any statistically significant relationship with the price-to-book ratio. The research indicates that environmental performance does not create immediate market value increases. Investors face their main obstacle because environmental initiatives which decrease emissions and handle waste and boost energy efficiency generate distant benefits which experts cannot measure at present. Organizations need to link their environmental initiatives to future financial advantages and regulatory advantages before the market start using environmental performance data for valuation purposes (Porter & van der Linde, 1995).

The social pillar shows a negative relationship with firm value which is both statistically significant and negative. The research findings show that businesses which achieve better social results will have lower price-to-book ratios. The investor perspective expresses skepticism about social programs because they appear to increase business costs without providing immediate financial returns. The ongoing financial costs of employee welfare programs and diversity initiatives and training programs and community outreach activities produce long-term benefits which include better employee satisfaction and organizational reputation. Short-term valuation multiples from markets tend to decrease the value of companies which actively engage in social activities (Margolis & Walsh, 2003; Edmans, 2011).

The governance pillar also shows a negative and statistically significant relationship with firm value. Strong governance practices which include independent boards and better disclosure requirements and strict compliance rules will reduce managerial freedom to pursue risky expansion plans. Real-world corporate operations show that investors recognize these limitations because they restrict short-term business expansion which results in lower market value assessments. The research applies to the theory to demonstrate that managers need operational autonomy but organizations need to allocate funds for monitoring their expenses (Jensen & Meckling, 1976). The establishment of stronger governance systems helps to minimize agency risks which leads to better long-term stability, yet it could lead to negative market value changes because investors focus on short-term financial expansion.

The control variables in the firm value models at the pillar level show patterns which match the findings from previous research. Research indicates that big companies achieve better price-to-book ratios because their wide business scope and dominant market position results in better valuation performance (Fama & French, 1992). The research shows that firm value

benefits from positive effects of leverage and liquidity because markets value companies which can borrow money and maintain excellent short-term financial stability.

The analysis of ESG performance at each pillar shows that social and governance factors create negative value effects for firms but environmental performance does not. The research indicates that financial markets show greater reaction to social and governance initiative expenses than they do to environmental practices. The research findings from this section do not indicate that social and governance practices will create negative long-term results. The data reveals that investors use current market opinions to make their decisions which results in wrong assessments of sustainable investment potential.

The research data shows that investors need to evaluate market value independently from corporate performance because ESG practices create distinct impacts on these two variables. Short-term market penalties affect social and governance initiatives, but these programs generate enduring advantages through their ability to decrease risks and enhance organizational strength and build stronger relationships with stakeholders. The following section unites results from accounting-based and market-based measures to establish a full understanding of ESG factors' impact on financial performance.

**Table 5.11: Pillar-Level Regression Results – Firm Value (P2B)**

**Individual Pillar Model**

| Variable | Estimate | Std. Error | Significance |
|---|---|---|---|
| Intercept | 5.256 | 0.424 | *** |
| E | 0.0073 | 0.005 | |
| S | -0.0497 | 0.0056 | *** |
| G | -0.0531 | 0.0038 | *** |
| MktCap | 8.96E-12 | 2.18E-13 | *** |
| DtPer | 0.0475 | 0.00023 | *** |
| CR | 1.006 | 0.0717 | *** |

**Model Statistics:**

| R-squared | Adj. R-squared | Residual Std. Error | F-statistic | Observations |
|---|---|---|---|---|
| 0.8131 | 0.813 | 7.229 | 7354 *** | 10,152 |

**Interpretation of Table 5.11**

The individual pillar regression results show that the environmental pillar (E) has a small positive coefficient of 0.0073 with a standard error of 0.005 but this coefficient does not reach statistical significance. The social pillar (S) shows a negative coefficient of −0.0497 which is statistically significant at the 1% level with a standard error of 0.0056. The governance pillar (G) displays a negative coefficient of −0.0531 which has a standard error of 0.0038 and reaches statistical significance at the 1% level.

The social and governance pillars produce negative effects which are statistically significant on the price-to-book ratio because markets tend to reduce the value of companies that spend more on social programs and have more stringent governance systems. The research conducted prior to this study showed that organizations which combine social responsibility initiatives with governance enhancements will achieve superior long-term stability and risk management, but their financial worth emerges only through extended time periods rather than through P2B market-based evaluations in the short term (Edmans, 2011; Jensen & Meckling, 1976).

The market capitalization variable shows a statistically significant positive relationship through its coefficient value of 8.96E−12 while its standard error amounts to 2.18E−13 at a 1% significance level. The debt-to-equity ratio shows a positive relationship with firm value which researchers have proven statistically significant at a 1% level with an estimated coefficient of 0.0475 and a standard error of 0.00023. The current ratio also has a positive and statistically significant coefficient of 1.006 with a standard error of 0.0717, significant at the 1% level.

The interception term has an estimated value of 5.256 with a standard error of 0.424 and is statistically significant at the 1% level. The model predicts this value of firm worth when all variables used for explanation have their base values.

In terms of model fit, the R-squared value is 0.8131, while the adjusted R-squared is 0.813, indicating that a large proportion of the variation in firm value is explained by the model. The residual standard error is 7.229, reflecting the dispersion of the residuals around the fitted values. The F-statistics of 7,354 is statistically significant at the 1% level, indicating that the model is jointly significant. The regression is estimated using 10,152 observations.

## 5.6 Robustness Analysis Using Generalized Least Squares (GLS)

The following section shows the results of generalized least squares (GLS) estimation which solves the econometric problems that diagnostic tests revealed. Research conducted earlier shows that firm-level panel data contains heteroskedasticity and serial correlation which makes OLS estimators less efficient while producing incorrect standard error results (Baltagi, 2005; Wooldridge, 2010). The evaluation process for ESG research requires special attention to these matters because researchers need to manage extensive datasets which contain information about multiple organizations (Friede, Busch, & Bassen, 2015).

The GLS estimation method solves both autocorrelation and heteroskedasticity problems by specifying the complete variance–covariance structure of the error term. The research method functions as the main analytical tool for corporate finance studies which examines governance systems and sustainability practices and their impact on business performance when researchers determine that standard regression assumptions fail to apply (Gujarati & Porter, 2009; Wintoki, Linck, & Netter, 2012). The research employs GLS to verify ESG performance that leads to financial results while solving the identified econometric issues.

The GLS results for corporate financial performance, measured by return on equity, largely confirm the findings obtained from the baseline and robustness OLS models. The aggregate ESG coefficient shows a positive and statistically significant value which proves that ESG performance leads to better profitability without being affected by estimation errors or standard error inefficiencies. The results from different estimation methods show that businesses which implement sustainability practices will achieve better operating performance. The research results support stakeholder theory because this theory demonstrates that organizations which handle their stakeholders effectively will achieve better operational performance and business results (Freeman, 1984).

Firm size continues to exhibit a strong positive relationship with ROE in the GLS framework. Research evidence shows that bigger companies achieve better results through their ability to scale up operations and expand their business activities and secure outside funding (Fama & French, 1992). Large firms have better capabilities to handle ESG sustainability initiative costs because they can bear the expenses needed for compliance systems and reporting infrastructure and environmental investments. Large firms can achieve better financial performance through ESG engagement because this approach requires less investment which enables them to generate higher profits (Ioannou & Serafeim, 2012).

The GLS estimation shows that Leverage maintains a positive relationship with ROE because it follows the leverage effect which corporate finance researchers (Jensen & Meckling, 1976) have documented. Research shows that companies which use debt financing can increase equity holder returns through their ESG initiatives. Organizations need to find the correct equilibrium between their debt utilization and sustainability objectives because excessive debt usage threatens their future financial stability. The statistical results show that Liquidity does not affect the results which support previous research that short-term liquidity does not impact profitability when other company characteristics are included in the analysis.

The ESG coefficient becomes more important because researchers use total assets instead of firm size in their GLS specification which causes the coefficient to grow in size. The research established that ESG factors have a direct link to profitability because businesses which adopt sustainable methods achieve higher asset utilization efficiency. Previous research shows that ESG initiatives produce operational advantages which lead to enhanced asset performance and reduced future costs that produce financial gains (Porter & van der Linde, 1995; Edmans, 2023).

The GLS results for firm value, measured by the price-to-book ratio, are also consistent with the OLS findings. The aggregate ESG coefficient displays a negative value which maintains statistical significance to demonstrate that financial markets at present decrease ESG engagement values during brief time periods even though researchers employed techniques to address autocorrelation and heteroskedasticity. Research shows investors remain skeptical about ESG initiatives because they see these programs as costly programs which deliver unpredictable financial performance (Margolis & Walsh, 2003; Hong, Karolyi, & Scheinkman, 2012).

The GLS robust analysis shows that different estimation methods produce similar results which support the main findings of the study. ESG performance is positively associated with accounting-based profitability but negatively associated with short-term market valuation. The relationships between variables continue to exist throughout both OLS and GLS estimation methods which decreases the risk that results stem from statistical errors and makes the study's results more reliable. The research results show that investors must distinguish between their short-term market responses and business operational outcomes to determine how ESG practices impact financial performance.

**Table 5.12: The GLS regression-ROE Model.**

**GLS Regression – ROE Model**

| Variable | Estimate | Std. Error | t value | Significance |
|---|---|---|---|---|
| Intercept | 19.542 | 1.872 | 10.44 | *** |
| ESG | 0.0598 | 0.0251 | 2.39 | * |
| MktCap | 0 | 0 | 17.49 | *** |
| DtPer | 0.0337 | 0.00103 | 32.63 | *** |
| CR | -0.2693 | 0.318 | -0.85 | |

**Interpretation of Table 5.12**

From the GLS regression results reported in Table 5.12, the ESG score shows a positive and statistically significant relationship with return on equity (ROE). The ESG coefficient shows an estimated value of 0.0598 while its standard error amounts to 0.0251 and its t-value reaches 2.39 which leads to a 10% level of statistical significance.

Businesses which allocate resources to ESG initiatives that include energy efficiency and employee welfare and governance transparency will achieve better operational results and financial performance in future periods according to the research. Prior empirical evidence similarly finds that ESG engagement improves firm efficiency and financial outcomes, particularly through risk reduction and improved stakeholder relations (Friede, Busch, & Bassen, 2015).

The Market capitalization variable shows a zero-coefficient value because of scaling but its t-value of 17.49 proves its statistical significance. The debt-to-equity ratio shows a positive relationship with its coefficient value at 0.0337, which has a standard error of 0.00103 and a t-value of 32.63 that reaches statistical significance at the 1% level. The current ratio shows a negative coefficient value of −0.2693 but the t-value of −0.85 indicates this variable does not have statistical significance.

The intercept term shows an estimated value of 19.542 with a standard error of 1.872 and a t-value of 10.44, which confirms its statistical significance at the 1% level. The model produces this ROE value when all input variables stay at their default settings which are set to zero.

**Table 5.13: The GLS regression-ROE Model(with TA)**

| Variable | Estimate | Std. Error | t value | Significance |
|---|---|---|---|---|
| Intercept | 14.246 | 1.899 | 7.5 | *** |
| ESG | 0.1863 | 0.0261 | 7.12 | *** |
| TA | 0 | 0 | -4.33 | *** |
| DtPer | 0.03371 | 0.00105 | 32.17 | *** |
| CR | -0.0784 | 0.323 | -0.24 | |

**Interpretation of Table 5.13**

The GLS regression results in Table 5.13 show that ESG scores positively affect ROE while total assets function as the size variable which determines firm size. The ESG coefficient shows a statistical significance at the 1% level because its t-value reaches 7.12 while its standard error amounts to 0.0261 and its estimated value equals 0.1863.

Research data shows that ESG performance leads to superior ROE when scientists use total assets to determine company size because sustainability funding produces superior financial outcomes for businesses which focus on maximizing their asset management. Research conducted before this study showed that ESG initiatives result in improved corporate performance because they enable organizations to handle their resources better and minimize risks mainly in large corporations (Friede, Busch, & Bassen, 2015).

The total assets variable shows a zero coefficient because of scaling but its t-value of −4.33 shows that this variable has statistical significance. The debt-to-equity ratio shows a positive relationship with its coefficient value at 0.03371, which has a standard error of 0.00105 and a t-value of 32.17 that reaches statistical significance at the 1% level. The current ratio shows a negative coefficient of −0.0784 yet its t-value of −0.24 indicates that this variable does not reach statistical significance.

The intercept term shows an estimated value of 14.246 while its standard error amounts to 1.899 and its t-value reaches 7.50, which proves its statistical significance at the 1% level. The

model shows the predicted ROE value which occurs when all input variables have their default values at zero.

**Table 5.14: GLS Regression ROE model(E, S,G)**

| Variable | Estimate | Std. Error | t value | Significance |
|---|---|---|---|---|
| Intercept | 20.676 | 1.886 | 10.96 | *** |
| E | 0.1054 | 0.0222 | 4.74 | *** |
| S | 0.0283 | 0.0248 | 1.14 | |
| G | -0.1029 | 0.0169 | -6.09 | *** |
| MktCap | 0 | 0 | 18.33 | *** |
| DtPer | 0.0331 | 0.00103 | 32.02 | *** |
| CR | -0.1554 | 0.3185 | -0.49 | |

**Interpretation of Table 5.14**

The GLS regression results in Table 5.14 show that the environmental pillar (E) creates a positive connection with return on equity (ROE) which is statistically significant. The estimated coefficient for E equals 0.1054 while its standard error amounts to 0.0222 and its t-value reaches 4.74 which proves statistical significance at the 1% level.

Organizations that use energy-saving technologies and emission reduction methods for environmental efficiency will achieve cost reductions and operational enhancements which result in better profitability during the long term. Governance mechanisms that operate with strictness will limit manager freedom to act while making organizations spend more on following rules which results in lower immediate financial gains but leads to better long-term business stability (Porter & van der Linde, 1995; Jensen & Meckling, 1976).

The social pillar (S) shows a positive coefficient of 0.0283 yet its t-value of 1.14 fails to establish statistical significance for this relationship. The governance pillar (G) shows a negative connection to ROE which is statistically significant at 1% level with an estimated coefficient of −0.1029 and a standard error of 0.0169 and a t-value of −6.09. Organizations that enforce strict governance practices will achieve lower short-term financial performance because they need to allocate additional resources for activity monitoring and rule compliance.

The Market capitalization report shows a zero-coefficient value because of scaling but the t-value of 18.33 proves its statistical significance at the 1% level. The debt-to-equity ratio shows a positive relationship with ROE which reaches statistical significance at 0.0331 with a

standard error of 0.00103 and a t-value of 32.02. The current ratio shows a negative coefficient of −0.1554 yet its t-value of −0.49 indicates that this variable does not reach statistical significance.

The interception term shows an estimated value of 20.676 with a standard error of 1.886 and a t-value of 10.96 which confirms its statistical significance at the 1% level. The model produces this ROE value when all input variables stay at their default settings which are set to zero.

**Table 5.15: GLS Regression Results P2B**

| GLS Regression – P2B Model | | | | |
|---|---|---|---|---|
| **Variable** | **Estimate** | **Std. Error** | **t value** | **Significance** |
| Intercept | 4.486 | 0.4228 | 10.61 | *** |
| ESG | -0.0812 | 0.00566 | -14.34 | *** |
| MktCap | 0 | 0 | 39.83 | *** |
| DtPer | 0.04754 | 0.000233 | 203.7 | *** |
| CR | 0.9533 | 0.07181 | 13.27 | *** |

**Interpretation of Table 5.15**

From the GLS regression results reported in Table 5.14, the ESG score exhibits a negative and statistically significant relationship with firm value measured by the price-to-book ratio (P2B). The ESG coefficient shows a statistically significant value of −0.0812 with a standard error of 0.00566 and a t-value of −14.34.

The market shows a negative and substantial connection between ESG performance and P2B because sustainability investments first require additional expenses which do not boost book value right away. Research findings indicate that ESG investment methods result in right away market value decreases which will generate beneficial results during subsequent time periods (Friede, Busch, & Bassen, 2015; Hong, Karolyi, & Scheinkman, 2012).

The Market capitalization variable shows a zero-coefficient value because of scaling but its t-value of 39.83 proves its statistical significance. The debt-to-equity ratio shows a positive relationship with the dependent variable because its coefficient value equals 0.04754 while its standard error amounts to 0.000233 and its t-value reaches 203.7 at a 1% significance level. The current ratio shows a positive relationship with its coefficient at 0.9533 which has a

standard error of 0.07181 and a t-value of 13.27 that reaches statistical significance at the 1% level.

The intercept term shows an estimated value of 4.486 with a standard error of 0.4228 and a t-value of 10.61 which proves statistical significance at the 1% level. The model predicts this value of firm worth when all input variables have their base values of zero.

**Table 5.16 : GLS Regression P2B (with TA)**

| Variable | Estimate | Std. Error | t value | Significance |
|---|---|---|---|---|
| Intercept | 2.4458 | 0.4547 | 5.38 | *** |
| ESG | -0.03856 | 0.00626 | -6.16 | *** |
| TA | 0 | 0 | 2.23 | * |
| DtPer | 0.04753 | 0.000251 | 189.43 | *** |
| CR | 1.122 | 0.07733 | 14.51 | *** |

**Interpretation of Table 5.16**

From the GLS regression results for the P2B model with firm size measured using total assets, the ESG score shows a negative and statistically significant relationship with firm value. The ESG coefficient receives an estimated value of −0.03856 while its standard error amounts to 0.00626 and its t-value reaches −6.16 which proves its statistical significance at the 1% level.

Organizations which focus on sustainability will experience lower market value during short-term periods because their asset-based business models require immediate expenses which do not result in market value increases according to the negative ESG–P2B relationship. Research conducted earlier shows that markets first reduce the value of ESG expenses until investors can see the lasting financial benefits (Eccles, Ioannou, & Serafeim, 2014; Friede, Busch, & Bassen, 2015).

The total assets variable shows a zero coefficient because of scaling but its t-value of 2.23 indicates statistical significance at a 10% level. The debt-to-equity ratio shows a positive relationship with its coefficient value at 0.04753 which has a standard error of 0.000251 and a t-value of 189.43 that reaches statistical significance at the 1% level. The current ratio demonstrates a positive relationship with the model through its 1.122 coefficient which has a standard error of 0.07733 and a t-value of 14.51 that reaches statistical significance at the 1% level.

The intercept term shows an estimated value of 2.4458 while its standard error amounts to 0.4547 and its t-value reaches 5.38, which proves its statistical significance at the 1% level.

The model predicts this value for firm worth when all input variables have their base values of zero.

**Table 5.17: GLS Regression – P2B Model (E, S, G)**

| Variable | Estimate | Std. Error | t value | Significance |
|---|---|---|---|---|
| Intercept | 5.2556 | 0.4244 | 12.38 | *** |
| E | 0.00729 | 0.00501 | 1.46 | |
| S | -0.04974 | 0.00557 | -8.93 | *** |
| G | -0.05308 | 0.0038 | -13.96 | *** |
| MktCap | 0 | 0 | 41.18 | *** |
| DtPer | 0.04748 | 0.000233 | 204.16 | *** |
| CR | 1.0064 | 0.07167 | 14.04 | *** |

**Interpretation of table 5.17**

From the GLS regression results reported in Table 5.17, the environmental pillar (E) shows a positive but statistically insignificant relationship with firm value measured by the price-to-book ratio (P2B), as indicated by its coefficient of 0.00729 and a t-value of 1.46. The social pillar (S) shows a negative connection with P2B which has a statistically significant estimated coefficient of −0.04974 and a t-value of −8.93 at the 1% significance level. The governance pillar (G) shows a negative relationship with firm value which is statistically significant because its coefficient equals −0.05308 and its t-value reaches −13.96.

The Market capitalization variable shows a zero-coefficient value because of scaling but its t-value of 41.18 indicates strong statistical significance. The debt-to-equity ratio shows a positive relationship with P2B, which achieves statistical significance at 0.04748 while its t-value reaches 204.16. The current ratio maintains a positive significant relationship with market value at 1.0064 which indicates that investors select businesses that maintain excellent liquidity positions. The intercept term shows statistical significance at the 1% level because it indicates the predicted firm value which occurs when all variables in the model have their values at zero.

Organizations need to allocate funds for short-term compliance expenses and restructuring costs to execute social and governance initiatives in their real-world operations which will result in improved sustainability and risk management through enhanced monitoring systems that decrease market value in the short term. Previous research indicates that market values will

decrease when organizations start social and governance initiatives which will not generate their projected long-term benefits (Friede, Busch, & Bassen, 2015; Jensen & Meckling, 1976).

**Overall Interpretation of GLS Results**

Taken together, the GLS results confirm the robustness of the study's main findings. ESG performance is positively associated with accounting-based profitability but negatively associated with short-term market valuation. The study's findings from OLS and GLS estimations show identical results which confirm the research validity and demonstrate that ESG practices create operational advantages which financial markets fail to value properly during short-term periods.

## 5.7 Summary of Empirical Results

The following section unites all empirical results which stem from using different econometric models throughout this research. The research aims to combine all findings from accounting-based and market-based performance measures and baseline and extended specifications and pillar-level analyses and robustness checks to create a unified understanding of ESG performance effects on corporate financial results.

| No. | Hypothesis | Empirical Evidence | Decision |
|---|---|---|---|
| 1 | **H1:** ESG performance is significantly associated with firms' short-term financial performance (ROE). | ESG shows a positive and statistically significant relationship with ROE across OLS and GLS specifications, though effect size remains modest. | **Accepted** |
| 2 | **H2:** ESG performance is significantly associated with firms' long-term value creation measured by P2B. | ESG exhibits a statistically significant **negative** relationship with P2B across baseline, controlled, and GLS models. | **Accepted (negative effect)** |
| 3 | **H3:** Environmental, Social, and Governance pillars are significantly associated with firms' financial performance and firm value. | Pillar-level results show heterogeneous effects: Environmental performance is positive for ROE but insignificant for P2B, Social and Governance pillars show negative and significant effects on firm value, while governance negatively affects ROE. | **Partially accepted** |

The research findings show that ESG performance at the company level creates a positive relationship with financial performance which return on equity represents. The ESG coefficient shows a positive and statistically significant relationship across all models including baseline and main and robustness and GLS. The coefficient size remains small throughout all models.

The research indicates that organizations which show superior ESG performance will obtain better financial outcomes and sustain their market standing through their size and leverage and liquidity management and their handling of heteroskedasticity and autocorrelation problems. The research results support stakeholder theory because organizations which handle their stakeholders effectively will obtain better operational results and sustainable business success (Freeman, 1984). The study supports earlier research which shows ESG performance leads to beneficial business results in specific industrial contexts (Friede, Busch, & Bassen, 2015).

The price-to-book ratio analysis of firm value shows that ESG performance has a negative impact on market valuation in all cases. The negative relationship between ESG engagement and stock prices exists in all four model variations which include baseline and extended and robustness and GLS specifications. The short-term market reaction to ESG engagement seems to result in financial market discounting of these companies. The research shows that accounting performance metrics do not match the market value assessments which investors use to evaluate their investments. ESG practices seem to enhance internal profitability but investors view sustainability initiatives as expense-draining and they doubt these initiatives will generate financial returns in the future. Previous research shows that markets fail to recognize ESG investments because their long-term non-financial benefits which protect against risks do not produce immediate monetary returns (Margolis & Walsh, 2003; Edmans, 2023).

The ESG dimension analysis at the pillar level shows that different environmental social and governance aspects have different levels of variation. The research shows that environmental performance leads to better financial performance, but it does not create any substantial effect on corporate worth. The research indicates that environmental programs create operational efficiency gains through cost savings and process enhancements which financial markets fail to detect during their initial assessment period. Social performance does not create substantial financial effects on profitability, but it negatively affects firm value because markets treat social initiatives as expenses which do not generate short-term financial benefits. The performance of governance systems shows negative correlations with both financial performance and company market worth because these organizations must spend money on monitoring activities and compliance work and limit their managers' freedom according to agency theory (Jensen & Meckling, 1976).

The research employed various size indicators together with multiple statistical approaches to confirm that the main findings persisted unchanged. The research results demonstrate that various model configurations produce equal coefficient directions and statistical significance results which reduce the chance that the findings result from model problems or statistical anomalies. The research results demonstrate how economic factors between ESG engagement and firm operations and investor views operate in the market.

The research data shows ESG performance creates two separate effects which lead to different impacts on corporate business performance. Organizations that practice ESG engagement will achieve better accounting-based profitability because they can optimize their operations and establish better stakeholder connections and enhance their risk management systems. Financial markets show a delay in understanding these benefits which results in superior sustainability performers receiving lower market value assessments. Research studies reveal ESG practice financial impacts through their analysis of market-based short-term perceptions and company-wide long-term performance indicators.

The following section presents empirical research findings which will serve as the basis for the final chapter to explore management and investment and policy implications and study constraints and research possibilities.

# Chapter 6

# Conclusion and Implications

## 6.1 Conclusion

This study observes how environmental, social and governance (ESG) performance relates to corporate financial results which focus on profitability and market value. It offers new proof of how sustainable practices affect the performance of a business using a large dataset and detailed analysis methods. The research contributes to the discussion about how ESG engagement impact businesses by evaluating different models.

The findings show that better financial outcomes, determined by return on equity (ROE), are linked with EGS performance. This relationship holds true across models and checks, refers that companies with stronger ESG efforts are more profitable. This supports the notation that sustainability practices improve productivity and stakeholders' relations. These results align with stakeholder theory, which says that companies considering the interest of many groups have a good chance of financial success (Freeman, 1984).

The analysis finds a negative relation between ESG performance and firm value, measured by price to book ratio. All models show a negative correlation, which means that markets could not reward ESG efforts in the short term. This could be because of worries about increased expenses, less flexibility, or uncertainty about when ESG benefits will appear. According to previous research, there is a gap between how businesses and investor's view sustainability, as seen by the difference between accounting results and market value (Margolis & Walsh, 2003; Edmans, 2023).

Pillar level analysis adds more complexity by showing that ESG effects differ across dimensions. Profitability and environmental performance are strongly correlated, but they do not significantly influence. Examining each ESG area independently, the effects are different. The fact is environmental performance is linked to higher profitability but little effect on firm valuation which suggests that market may not quickly see the advantages of environmental actions. Although social performance has no effect on profits, it is associated with a lower firm value, therefore in the short run, markets may view social efforts as expensive. According to agency theory, governance performance is associated with lower profits and company value, likely due to the short-term costs of better monitoring and compliance (Jensen & Meckling,

1976). Financial markets may take longer to acknowledge internal through efficiency gains and better shareholder relations. If regulatory frameworks or long-term investors don't support ESG initiatives, companies may be discouraged from fully committing to them due to the temporal mismatch between costs and profits.

In summary, this study adds to ESG research by providing strong evidence about the financial impacts of sustainable practices. The report provides a clear view of how ESG performance affects business finances by looking at both accounting and market outcomes and breaking down ESG into its pieces. These findings lay the stage for the discussion of future research, management techniques, and policy which are covered next.

## 6.2 Policy Implications

Policy makers, regulators and standard setters in corporate governance and sustainable finance should consider the findings of the study. The findings reveal that even though ESG performance has positive impacts on profitability, the negative impact of this was found to diminish firm market value in the short term. This discrepancy between internal results and market perceptions highlights the importance of policies that promote improved information sharing and a long-term perspective on sustainability.

First, the positive relationship between ESG performance and return on equity means that sustainability behaviors can improve firms' efficiency in operation and profitability. From a policy perspective, this result provides an argument in favor of promoting ESG engagement as a business priority, rather than just as a social concern. Policy makers can be instrumental in encouraging companies to pursue ESG initiatives, especially those that affect environmental performance and business ethics. Policy levers including tax breaks, incentives for green technologies, and subsidized financing of sustainable projects can mitigate the near-term costs attributed to ESG investments (Porter & van der Linde, 1995; OECD, 2015).

Second, continuous negative relation between ESG and business value indicates that stock prices may not reflect the long-term benefits of sustainability. This has significant implications for financial rules and regulations. Better ESG reporting guidelines can make things clearer and reduce doubts about the financial benefits of sustainability. Investors can judge the long-term value of ESG with the help of regulations such as required ESG reports, standard measures, and third-party reviews (Eccles, Ioannou, & Serafeim, 2014; EU Commission,

2020). Better transparency could also help to reduce the short-term drop-in value that seen for ESG focused businesses.

Third, the pillar-level findings disclose that markets treat environment, social and governance dimensions differently. On the one hand, environmentally friendly practices drive profitability, however they are not priced into firm valuation which largely implies that investors do not fully appreciate the long-term operational efficiencies of environmental strategies. Policymakers can close this gap by reinforcing environmental laws and implementing carbon pricing schemes that clearly link environmental performance to financial outcomes. Predictability of future cashflows from sustainability investments can be enhanced by clear and credible environment policies, which encourage markets to more accurately price environmental performance (Porter & van der Linde, 1995; Stern, 2007).

Policy should also address the negative valuation effects of social and governance performance. Many social programs on employee welfare, diversity and community also bring long-term benefits that cannot be measured in terms of finance. These efforts can be encouraged by policymakers who would want to push for social reporting standards and embed social metrics in wider sustainability frameworks. A governance reform — even if it is a costly one in the short-term — can be beneficial, as they are likely to resolve agency issues and contribute to strengthening firm stability over the longer term. Regulatory initiatives that increase corporate governance standards, for example board independence regulations or transparency enforcement, could serve to align managerial motives with the creation of long-term value (Jensen & Meckling, 1976; La Porta et al., 1998).

Moreover, it also underscores the need to encourage a long-term perspective among market players. As example, short-term market pressures might deter firms from making ESG investments, as these benefits comes only in the long term. To encourage a long-term perspective, governments can support stewardship codes, encourage sustained shareholder engagement, and support institutional investor guidelines, which can focus on sustainable value creation rather than short-term performance (Edmans, 2023).

In addition, it also underscores the need to encourage a long-term perspective among market players. As example, short-term market pressures might deter firms from making ESG investments, as these benefits comes only in the long term. To promote a long-term view, governments may promote the development of stewardship codes, foster long-term shareholder

engagement, and promote institutional investor guidelines that focus on sustainable value creation rather than short-term performance (Edmans, 2023). This may help to bridge the gap between the long-term internal profitability of ESG practices and their recognition in the market.

## 6.3 Managerial Implications

The findings from this study have several implications for managers responsible for sustainability strategy. From the evidence, ESG performance is linked to improved profitability but can be associated with lower market value. This set of results is critical for managers as they try to meet the short-term needs of the financial statements while trying to meet long-term goals.

First, the positive relationship between ESG performance and return on equity suggests that sustainability initiatives have the potential to improve the firm's internal operational performance. Management should consider the ESG engagement strategy not only as a compliance or reputational exercise, but as a key part of the value creation process within the firm. Environmental efficiencies, workplace improvements, supply chain management, and other such initiatives have the potential to reduce operational inefficiencies and risks in the long term. Past studies have suggested that firms that have integrated sustainability into their core operational activities are more likely to benefit financially than those that have adopted ESG practices in a fragmented or symbolic manner (Porter & van der Linde, 1995; Eccles et al., 2014).

Second, the negative impact of ESG on financial markets in the short term may also influence managers. Managers may feel pressured by investors who expect quick returns. This may lead to a disconnect between how well the firm is doing and how the firm is perceived to be doing. Managers should bridge this disconnect by opening up and explaining their rationale for ESG investments, such as cost savings, risks, and regulations. This may also help investors understand the value of sustainability and may alleviate the discount seen in the results (Ioannou & Serafeim, 2012; Edmans, 2023).

The pillar-level results provide managerial planning with further details of guidelines for managerial strategy. Given the favorable effect of environmental performance on profitability, it appears a manager's focus should be concentrated on environmental projects to improve operational efficiencies and be sustainable (energy optimization, waste reduction, process innovation). Such initiatives would be more likely to provide financial return on investment

and can be accounted for using the metrics that we're familiar with in normal performance analysis. On the other hand, social initiatives are important for an organization's culture and long-term resilience but do not necessarily generate returns that may contribute to profitability short term. Thus, the bottom line is that managers should take a prolonged view on employee welfare, diversity, and community engagement in an effort to ensure that their benefits come over the long run by rising retention, morale, and reputation (Freeman, 1984; Edmans, 2011).

The negative relationship between the performance of governance and short-run financial results illustrates the cost implications of enhanced monitoring and compliance mechanisms. Managers must not use this as an excuse for undermining governance systems. Instead, it underscores the importance of implementing governance reforms efficiently and proportionately. While it may require upfront expenses, strong governance can mitigate agency problems, enhance decision-making quality, and shield the firm from longer-term risks (Jensen & Meckling, 1976). Hence, managers must shift the orientation of governance investments towards risk management tools rather than short-term profit drivers.

Furthermore, the consistency of results across various model scenarios indicates that the association between ESG performance and financial outcomes is strong and not simply methodological artefacts. This suggests that managers must consider ESG in their long-term strategic plans and not treat sustainability projects as an additional (or a one off) project. Incorporating ESG measurements in performance evaluations and reward systems may contribute to reconciling short term managerial decisions with longer term value creation aims (Eccles et al., 2014).

Overall, the findings show the importance of managerial patience and effective communication in realizing the benefits of ESG engagement. Even if these ESG initiatives require higher upfront costs and face skepticism from financial markets, they have the potential to enhance operational efficiency and strengthen firm resilience over time. When managers embed sustainability into their core strategies and convey the long-term value proposition of sustainability to stakeholders, there is a greater likelihood they will benefit from ESG investments and achieve better financial performance in the long run.

## 6.4 Limitations and Directions for Future Research

This study shows a connection between how well a company does, with Environmental, Social and Governance issues and its financial results. However, there are some things that the study does not do perfectly. It is important to know what these things are so we can understand the

results of the study and plan what to do with the Environmental, Social and Governance research.

First, this research uses ESG scores from outside data providers. While these ratings are common in research, they can have errors and vary between agencies. Past studies have found differences in ESG ratings because of different data, weights, and criteria (Berg, Kölbel, & Rigobon, 2022). So, the ESG measures here may not fully show a company's real sustainability. Future research could compare different ESG rating sources or create custom ESG scores using company reports.

Second, linear correlations between ESG performance and financial results are the vital focus of this analysis. ESG literature commonly uses linear models, but there may be a nonlinear relation between sustainable practices and financial performance. As example, excessive investment may result in diminishing returns, while moderate ESG engagement may enhance performance. Future research should explore nonlinear specifications and threshold effects to capture more complex changes in the ESG–performance relationship (Friede, Busch, & Bassen, 2015).

Third, our study focuses on near- to medium-term financial outcomes, most notably on accounting-based profitability and market valuation. However, ESG activities are often long-term strategic investments with potential long-term advantages. So, a short-term mismatch between costs and benefits may be the cause of the study's unfavorable short-term valuing effects. As suggested by previous literature, future research should employ dynamic panel models or longer time horizons to examine whether ESG engagement produces long-term positive value impacts (Edmans, 2023).

Forth, the research does not specifically include industry or country differences, though it takes considers some company-specific factors. The financial effects of ESG practices can varies significantly depending on industry and regulation. As example, companies in environmentally sensitive fields may have different ESG results than those in the services sector. Future research could include industry and country factors to better understand these differences (La Porta et al., 1998; Ioannou & Serafeim, 2012).

Fifth, the Augmented Dickey–Fuller (ADF) test, which applied in time-series analysis, is used in this research to test stationarity. Alternative unit root test, as example the Levin–Lin–Chu (2002) test, might be better suitable for panel data settings. It is important to note that, although

not specifically addressing stationarity or non-stationarity issues, many early and significant studies in related research provided insightful findings, which are shown by Cochran and Wood (1984).

This research looked at things as they happened, so linking actions to results isn't possible here. What came out might point toward connections, yet exact triggers remain uncertain - even with tighter validation. Looking ahead, studies may rely on methods such as difference-in-differences or instrumental variables to see whether ESG alters financial outcomes (Wooldridge,2010).

In conclusion, despite these limitations, this study adds to ESG research by providing a thorough look at how sustainability affects business finances. We will achieve a better understanding of how ESG performance impacts companies in different situations and over time.

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# Appendix

```
        Augmented Dickey-Fuller Test

data:  mydata$ESG
Dickey-Fuller = -9.9023, Lag order = 21, p-value = 0.01
alternative hypothesis: stationary
```

```
        Augmented Dickey-Fuller Test

data:  mydata$ROE
Dickey-Fuller = -11.882, Lag order = 21, p-value = 0.01
alternative hypothesis: stationary
```

```
Call:
lm(formula = ROE ~ ESG + MktCap + DtPer + CR, data = mydata)

Residuals:
    Min      1Q  Median      3Q     Max
-314.52  -13.31   -3.56    8.59  401.52

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  1.954e+01  1.872e+00  10.437   <2e-16 ***
ESG          5.977e-02  2.506e-02   2.385   0.0171 *
MktCap       1.688e-11  9.647e-13  17.493   <2e-16 ***
DtPer        3.372e-02  1.033e-03  32.629   <2e-16 ***
CR          -2.693e-01  3.180e-01  -0.847   0.3971
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 32.23 on 10147 degrees of freedom
Multiple R-squared:  0.1224,    Adjusted R-squared:  0.1221
F-statistic: 353.9 on 4 and 10147 DF,  p-value: < 2.2e-16
```

| | vars | n | mean | sd | median | trimmed | mad | min | max | range | skew | kurtosis | se |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ESG | 1 | 10152 | 69.01 | 13.09 | 70.94 | 69.90 | 12.08 | 25.29 | 93.30 | 68.02 | -0.68 | 0.26 | 0.13 |
| E | 2 | 10152 | 68.84 | 17.67 | 73.34 | 70.75 | 14.78 | 0.00 | 98.55 | 98.55 | -1.07 | 1.13 | 0.18 |
| S | 3 | 10152 | 72.59 | 16.04 | 75.40 | 73.76 | 16.15 | 19.98 | 98.14 | 78.16 | -0.63 | -0.21 | 0.16 |
| G | 4 | 10152 | 63.87 | 19.59 | 66.58 | 64.90 | 23.37 | 10.77 | 97.89 | 87.12 | -0.39 | -0.80 | 0.19 |
| ROE | 5 | 10152 | 30.23 | 34.40 | 24.96 | 26.48 | 16.53 | -121.37 | 506.26 | 627.64 | 4.72 | 50.87 | 0.34 |
| P2B | 6 | 10152 | 8.13 | 16.72 | 4.75 | 5.63 | 3.59 | 0.32 | 267.86 | 267.55 | 11.13 | 151.80 | 0.17 |

```
Call:
lm(formula = ROE ~ E + S + G + MktCap + DtPer + CR, data = mydata)

Residuals:
    Min      1Q  Median      3Q     Max
-315.21  -12.97   -3.49    9.21  402.88

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  2.068e+01  1.886e+00  10.962  < 2e-16 ***
E            1.054e-01  2.224e-02   4.741 2.16e-06 ***
S            2.832e-02  2.477e-02   1.143    0.253
G           -1.029e-01  1.690e-02  -6.086 1.20e-09 ***
MktCap       1.773e-11  9.673e-13  18.326  < 2e-16 ***
DtPer        3.309e-02  1.034e-03  32.017  < 2e-16 ***
CR          -1.554e-01  3.185e-01  -0.488    0.626
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 32.13 on 10145 degrees of freedom
Multiple R-squared:  0.1282,    Adjusted R-squared:  0.1276
F-statistic: 248.6 on 6 and 10145 DF,  p-value: < 2.2e-16
```

```
Call:
lm(formula = P2B ~ ESG + MktCap + DtPer + CR, data = mydata)

Residuals:
    Min      1Q  Median      3Q     Max
-73.952  -2.656  -0.457   2.059  66.988

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  4.486e+00  4.228e-01   10.61   <2e-16 ***
ESG         -8.117e-02  5.659e-03  -14.34   <2e-16 ***
MktCap       8.677e-12  2.179e-13   39.83   <2e-16 ***
DtPer        4.754e-02  2.334e-04  203.70   <2e-16 ***
CR           9.533e-01  7.181e-02   13.28   <2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 7.279 on 10147 degrees of freedom
Multiple R-squared:  0.8105,    Adjusted R-squared:  0.8104
F-statistic: 1.085e+04 on 4 and 10147 DF,  p-value: < 2.2e-16

>
```

```
        Jarque Bera Test

data:  residuals_ROE
X-squared = 873932, df = 2, p-value < 2.2e-16
```

```
       Durbin-Watson test

data:  mainmodel_ROE
DW = 0.099935, p-value < 2.2e-16
alternative hypothesis: true autocorrelation is greater than 0
```

```
> print(vif_results_ROE)
     ESG   MktCap    DtPer       CR
1.050719 1.047201 1.019877 1.025744
>
```

```
        studentized Breusch-Pagan test

data:  mainmodel_ROE
BP = 3735.3, df = 4, p-value < 2.2e-16
```

```
t test of coefficients:

               Estimate  Std. Error t value  Pr(>|t|)
(Intercept)  1.9542e+01  1.7440e+00 11.2054 < 2.2e-16 ***
ESG          5.9767e-02  2.3135e-02  2.5834  0.009796 **
MktCap       1.6876e-11  1.3769e-12 12.2560 < 2.2e-16 ***
DtPer        3.3722e-02  7.2383e-03  4.6587 3.222e-06 ***
CR          -2.6929e-01  2.6827e-01 -1.0038  0.315498
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

```
Generalized least squares fit by REML
  Model: ROE ~ ESG + MktCap + DtPer + CR
  Data: mydata
       AIC      BIC    logLik
  99402.68 99446.03 -49695.34

Coefficients:
                Value Std.Error  t-value p-value
(Intercept) 19.542073 1.8723512 10.43718  0.0000
ESG          0.059767 0.0250585  2.38509  0.0171
MktCap       0.000000 0.0000000 17.49310  0.0000
DtPer        0.033722 0.0010335 32.62928  0.0000
CR          -0.269287 0.3179706 -0.84689  0.3971
```

```
Generalized least squares fit by REML
  Model: ROE ~ ESG + TA + DtPer + CR
  Data: mydata
       AIC      BIC    logLik
  99682.53 99725.88 -49835.27

Coefficients:
                Value Std.Error  t-value p-value
(Intercept) 14.245952 1.8989295  7.50210  0.0000
ESG          0.186253 0.0261459  7.12358  0.0000
TA           0.000000 0.0000000 -4.33455  0.0000
DtPer        0.033709 0.0010480 32.16555  0.0000
CR          -0.078416 0.3229705 -0.24280  0.8082

 Correlation:
      (Intr) ESG    TA     DtPer
ESG   -0.920
TA     0.130 -0.311
DtPer -0.148  0.037 -0.002
CR    -0.353  0.037  0.079  0.136
```

```
Generalized least squares fit by REML
  Model: P2B ~ E + S + G + MktCap + DtPer + CR
  Data: mydata
       AIC      BIC    logLik
  69088.97 69146.77 -34536.49

Coefficients:
                Value Std.Error   t-value p-value
(Intercept)  5.255615 0.4244108  12.38332  0.0000
E            0.007288 0.0050053   1.45599  0.1454
S           -0.049739 0.0055729  -8.92514  0.0000
G           -0.053079 0.0038033 -13.95617  0.0000
MktCap       0.000000 0.0000000  41.17848  0.0000
DtPer        0.047479 0.0002326 204.15789  0.0000
CR           1.006355 0.0716670  14.04209  0.0000
```

```
Generalized least squares fit by REML
  Model: ROE ~ ESG + TA + DtPer + CR
  Data: mydata
       AIC      BIC    logLik
  99682.53 99725.88 -49835.27

Coefficients:
                Value Std.Error  t-value p-value
(Intercept) 14.245952 1.8989295  7.50210  0.0000
ESG          0.186253 0.0261459  7.12358  0.0000
TA           0.000000 0.0000000 -4.33455  0.0000
DtPer        0.033709 0.0010480 32.16555  0.0000
CR          -0.078416 0.3229705 -0.24280  0.8082

 Correlation:
      (Intr) ESG    TA     DtPer
ESG   -0.920
TA     0.130 -0.311
DtPer -0.148  0.037 -0.002
CR    -0.353  0.037  0.079  0.136

Standardized residuals:
       Min         Q1        Med         Q3        Max
-9.3995625 -0.4188931 -0.1151807  0.2535524 12.2423072

Residual standard error: 32.68202
Degrees of freedom: 10152 total; 10147 residual
```