OWN WORK DECLARATION

I, Arnav Verma hereby declare that this dissertation, “ESG Disclosure and Corporate Financial Performance: Sectoral and Regulatory Comparisons between the UK and India,” is entirely my own work. All data analysis, interpretation, and written content have been completed by myself. While I have made use of artificial intelligence (AI) tools to support my understanding of complex concepts and theoretical frameworks, particularly during the initial stages where I faced difficulties comprehending certain aspects, no part of the dissertation has been copied or written on my behalf. AI assistance was used solely as a learning aid and not as a substitute for my independent research, analysis, or critical thinking. All the sources used have been appropriately acknowledged and referenced in accordance with academic standards along with the University of Edinburgh guidelines.

ABSTRACT

This dissertation aims to find the impact of Environmental, Social, and Governance (ESG) disclosures on corporate financial performance (CFP), using a panel dataset of 53 firms across the UK and India between 2013 and 2023. The study explores whether ESG disclosures influence accounting and market-based financial outcomes and whether this relationship differs across regions (developed vs. developing), regulatory frameworks (voluntary vs. mandatory), and sectors (Energy, Financials, and Consumer Goods). Four research questions were addressed through Random Effects panel regression models, supported by diagnostic tests and descriptive analysis. The study also finds the impact of materiality by separating Environmental and Social disclosure scores.

The results for Research Question 1 and 2 show that the overall ESG disclosure score does not have a statistically significant effect on corporate financial performance. Results for Research Question 3 showed statistically significant and positive results, confirming that sector influences the relationship between ESG disclosure and CFP. The final research question isolated Environmental and Social scores from the overall ESG disclosure score. Results show a statistically significant positive effect of environmental disclosure score on ROA and ROE, but not on Tobin's Q. This dissertation has important implications for regulators/ policymakers, firms and investors.

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To my parents and family, thank you for being my constant source of strength, love, and unwavering support. Your sacrifices and endless faith in me have been the foundation of everything I've been able to achieve. Thank you for always believing in me and giving me this opportunity.

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FREQUENTLY USED TERMS IN PAPER

1. *ESG – Environmental, Social and Governance; framework built on CSR to measure the sustainable, social, and ethical impact of a firm.*
2. *CSR – Corporate Social Responsibility; model allows firms to regulate their impact on society*
3. *SDG – Sustainable Development Goals; 17 goals outlined by the United Nations as part of the 2030 Agenda*
4. *ROA – Return on Assets*
5. *ROE – Return on Equity*
6. *CFP – Corporate Financial Performance*
7. *Developed country/market – country which is economically advanced*
8. *Developing country/market: relatively low level of economic output*

CHAPTER 1

INTRODUCTION

1.1 Introduction

In recent years, Environmental, Social, and Governance (ESG) disclosure has become increasingly important to corporate reporting frameworks. Companies are now expected to move beyond traditional financial reporting and provide sustainability disclosures and reports to the public and stakeholders containing their strategic goals and objectives. ESG disclosures have thus evolved from voluntary, narrative-based reports into data-driven, quantifiable, performance-based frameworks that are integrated into annual reports and investment decision-making. Regulatory bodies have also been introduced across developed and developing economies, introducing standards for disclosure reports aimed at improving transparency, reliability, and accountability. In the United Kingdom, The UK Sustainability Reporting Standards (UK SRS), coming into effect from March 2025, is based on the International Financial Reporting Standard (IFRS) S1 and S2 framework, while in India, the Securities and Exchange Board of India (SEBI) introduced the Business Responsibility and Sustainability Reporting (BRSR) framework, transitioning from a CSR-led model to a mandatory ESG reporting structure for the top 1,000 listed firms.

1.2 Research Purpose

While there are many papers and studies involving ESG and its effect on financial performance, some studies report a positive association between ESG disclosure and corporate financial performance, resulting in improved risk management, operational efficiency, investor trust, and stakeholder alignment. In contrast, other studies challenge this view, arguing that ESG disclosures may lead to additional costs and just serve as a mere exercise than a strategic driver of value. However, it is important

to note that much of the empirical evidence to date is limited, with many studies being based on developed markets such as the United States, Western Europe and the UK. Whereas there are relatively less studies and papers on the effect of ESG disclosures and its impact on CFP in emerging economies like India. Furthermore, existing research overlooks the moderating role of sector-specific factors, making it difficult to distinguish which aspects of ESG disclosure contribute most meaningfully to financial outcomes.

This dissertation aims to address these research gaps by investigating whether ESG disclosures impact CFP and whether this relationship is shaped by regional, regulatory, or sectoral contexts. This study uses panel data from 53 firms operating in India and the United Kingdom between 2013 and 2023, the study employs Random Effects regression models to test the impact of ESG scores on ROA, ROE, and Tobin's Q. It also introduces interaction variables (moderators) to assess whether the relationship differs by country (UK vs. India), regulatory framework (voluntary vs. mandatory), and sector (Energy, Financials, and Consumer Goods). The concept of impact materiality has also been evaluated, taking Environmental and Social disclosure scores separately, testing their effects on financial measures.

This research offers a multi-faceted analysis, drawing on multiple theoretical frameworks to explain firm behaviour and stakeholder response. Signalling Theory provides insight into how firms use ESG disclosures to signal their efforts and build reputational capital. Stakeholder Theory and Legitimacy Theory help explain why firms engage in ESG reporting to maintain trust and alignment with societal expectations and pressures. Institutional Theory clarifies how regulatory pressures shape

disclosure practices, while Agency Theory underscores the need to align managerial behaviour with shareholder interests.

1.3 Conclusion

By integrating these theoretical perspectives with empirical analysis, this dissertation contributes to a deeper understanding of ESG disclosures and its impact. It promotes the need for a more evidence-based research on ESG's financial implications in both developed and developing market conditions, especially in light of recent global regulatory shifts. The findings aim to offer relevant insights for regulators, investors, firms and anyone seeking to understand and develop ESG strategies that are not only compliant but materially meaningful and financially sustainable.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Environmental, Social, and Governance (ESG) disclosures have become a key aspect of corporate reporting frameworks, due to increasing expectations from stakeholders, regulators and investors, in response to increasing concerns around climate change, social equity, and corporate governance. These disclosures aim to communicate how effectively corporations evaluate, manage, and implement strategies linked to reducing environmental impact, social responsibility, and governance practices. A strategic tool for long-term value creation, risk mitigation, and competitive differentiation, ESG disclosures and reports are now increasingly integrated within company financial reports and capital management decisions, signifying its growing relevance in strategic decision-making and driving sustainable business performance.

This chapter presents the foundational concepts of the dissertation topic and critically reviews existing literature to evaluate contributions, significance of the findings, and identify research gaps.

2.2 The Evolution of ESG Disclosure: Concepts, Frameworks, and Global Overview

The theoretical foundations of Environmental, Social, and Governance (ESG) disclosure demonstrates a continuous evolution that can be linked to the growing awareness of environmental responsibility and social impacts from the 1980s. As the global economy became more integrated, environmental impacts increased, leading to growing pressure from stakeholders, regulators and society. Consequently, companies began acknowledging their ecological and social impact because of their business operations.

Although the term “ESG” was coined in the early 2000s, its principles came under the broader concept of Corporate Social Responsibility (CSR). Howard Bowen’s influential work *The Social Responsibilities of the Businessman* (1953), is widely regarded as the starting point in the development of the CSR theory. He argued that businesses should be accountable not just to shareholders but also to employees, customers, and society as a whole, similar to the concept introduced by Clarkson (1995).

Archie Carroll’s CSR Pyramid (1991) classified corporate responsibilities into four categories: economic, legal, ethical, and philanthropic, helping in the further development of the CSR theory. Nonetheless, there were contrasting views by the economist Milton Friedman (1970), who famously argued that businesses should instead focus on increasing profits for its shareholders. This perspective led to a broader debate between shareholder value and stakeholder interests, something that continues to shape ESG policies and frameworks today.

The 1980s also saw the development of the concept of socially responsible investing (SRI). Investors started evaluating not only financial returns but also the ethical and social conduct of firms. This encouraged firms to disclose additional information about their environmental and social practices. Initially, CSR was voluntary and driven by philanthropic initiatives. Subsequently, firms started engaging in community service, social work and charity, but their efforts were unstructured and lacked clear standards (Gray et al., 1995).

The 1989 Exxon Valdez oil spill (Shaw and Institute of Marine Science, University of Alaska, Fairbanks, 1992), heightened external pressure leading to the development of reporting frameworks which were structured and comparable across firms and industries. The launch of the Global Reporting Initiative (GRI) in 1997, introduced standardised guidelines for sustainability reporting, including concepts like the triple-bottom line approach (Elkington, 1997), materiality, stakeholder expectations, and performance indicators. This was a major milestone in the evolution of CSR and ESG reporting as the GRI framework could be used globally, becoming more data-driven and quantifiable, aligning with long-term business strategies developed by firms (GRI - Mission & history, 2025).

The acronym “ESG” was developed by the United Nations (UN) report titled *Who Cares Wins* in 2004, covering three essential pillars: Environment (carbon emissions, water management, etc), Social (community impact, labour rights, etc) and Governance (board structure, shareholder rights, etc), reflecting the increasing scope of firm responsibility beyond profitability and vague reporting practices (IFC Advisory Services in Environmental and Social Sustainability *et al.*, 2008).

The 2010s saw the establishment of ESG rating agencies like MSCI and Sustainalytics, providing metrics for evaluating corporate ESG performance (MSCI, 2023; Sustainalytics, 2023). Moreover, the development of the United Nations Sustainable Development Goals (SDGs) in 2015 paved the way for organisations to focus on key measures, aligning their disclosures based on the 17 goals (THE 17 GOALS | Sustainable Development, 2025) and targets introduced to fight climate change and drive economic growth.

Other standards have also been developed since then, such as the Sustainability Accounting Standards Board (SASB), which targets sector-specific materiality, allowing firms to tailor their disclosures based on their industry (SASB, 2025). The Carbon Disclosure Project (CDP) which focuses on greenhouse gas emissions and climate-related risks (CDP, 2022). The European Union's Non-Financial Reporting Directive (NFRD) which mandates large firms to report on their environmental and social impacts (Hahnkamper-Vandenbulcke and European Parliamentary Research Service, 2021). The Securities and Exchange Commission (SEC) in the United States which mandates listed companies to disclose their material environmental risks (SEC.gov | SEC Adopts Rules to Enhance and Standardize Climate-Related Disclosures for Investors, 2024). The UK Sustainability Reporting Standards (UK SRS), coming into effect from March 2025, is based on the International Financial Reporting Standard (IFRS) S1 and S2 framework (IFRS Foundation, 2023). The Business Responsibility and Sustainability Reporting (BRSR) framework which replaced the Business Responsibility Report (BRR), a reporting format introduced by the Securities and Exchange Board of India (SEBI) in 2012, made disclosure a mandatory requirement for the top 1,000 listed companies by market capitalisation (SEBI, 2021). Hence, ESG disclosures and reporting frameworks have evolved from narrative reports into quantitative, performance-based metric reports.

The aforementioned frameworks illustrate the evolving landscape and growing relevance of corporate reporting and disclosures even though the effectiveness of disclosures varies across countries, sectors, and regulatory contexts. Since these frameworks demonstrate diverse philosophies such as the UK's investor-focused model and India's regulatory transitioning of CSR into ESG, they collectively address

the need for standardized, reliable, and comparable data. While their impact on CFP will be assessed later in Section 2.4, this overview underscores the need to examine ESG disclosure practices within both developed (UK) and developing (India) regulatory frameworks.

2.3 Theoretical Foundations

The relationship between ESG disclosure and CFP requires a strong theoretical foundation as it lays the groundwork for understanding why and how firms engage in sustainability reporting, and the potential consequences it has in terms of financial outcomes and broader organisational legitimacy by fulfilling stakeholder expectations. Having a robust theoretical understanding and knowledge enables researchers, academics, leaders and policymakers to critically understand the concept of sustainability, its core concepts and explore correlation, causality, allowing to interpret whether firms disclose sustainability as a deliberate business strategy and demonstrate how stakeholder expectations and pressures can drive a firm's decision to restructure their strategic objectives and engage in ESG disclosures.

This section explores key theoretical frameworks such as the Stakeholder Theory, Legitimacy Theory, Resource-Based View, Signalling Theory and the Agency Theory that offer explanations behind the strategic motivations behind ESG disclosure and practices, and its potential impact on a firm’s financial performance. By aligning the firm's strategic objectives with sustainability/ESG, organisations can leverage these theoretical foundations to their advantage and decision-making, as these theories are not mutually exclusive (Friede, Busch and Bassen, 2015), offering a new lens and

explaining the link between ESG disclosures and CFP from a different angle. The next section explains each of these theories in detail, outlining its relevance to ESG disclosure and how it can drive CFP.

2.3.1 Signalling Theory

Signalling Theory, originally proposed by Spence (1973) in his paper *Job Market Signalling* argues that individuals and organisations (in the job market context) can signal their ability and quality to potential employers through actions which seem and are perceived as credible (Connelly et al., 2011). Educational achievements act as a credible signal of the candidate's ability, making it harder and costlier for individuals to obtain that achievement, distinguishing them from other candidates (Dhaliwal et al., 2011; Kim & Lyon, 2015). Moreover, this signal is harder to fake, ensuring its reliability and aiding in the decision-making of employers (Kim & Lyon, 2015).

In the context of ESG and sustainability, strong ESG performance and practices can signal a firm's commitment to its stakeholders, ensuring credibility, enhancing investor and stakeholder confidence, and improving reputation (Connelly et al., 2011; Lys et al., 2015; Greening and Turban, 2000). By adopting sustainability practices and measures, a firm can distinguish itself from its competitors and other firms with weaker ESG focus, reinforcing its market positioning, long-term growth and value creation (Dhaliwal et al., 2011; Kim and Lyon, 2015).

ESG disclosures entail costs to the company, which is consistent with the signalling theory as firms which are truly committed to sustainability will incur the cost of reporting their practices, aligning themselves with the SDG's and differentiating themselves as

leaders in their respective industries (Dhaliwal et al., 2011; Cormier and Magnan, 2007). Moreover, producing credible sustainability reports poses additional challenges for firms, as they must document their sustainability initiatives and demonstrate alignment with global standards and SDGs, ensuring consistency. These reports are published annually with the firm's financial statements which can be accessed publicly. ESG reporting requires data collection and verification, reinforcing its role as a credible signal of genuine sustainability efforts. In the current landscape, third-party ESG ratings and audits play a crucial role in enhancing the credibility of ESG disclosures by reducing information asymmetry between firms and investors and consistent ESG performance over time contribute to fostering long-term investor confidence and solidifying stakeholder trust.

However, the risks of greenwashing, where companies might present misleading or exaggerated claims about their sustainability efforts and practices is a major challenge and limitation of the Signalling Theory. This goes against the idea that reliable signals must be costly and trustworthy. Larger firms, having access to more resources and capital, gives them an unfair advantage over smaller firms (Barney, 2018) because they can handle the costs of reporting and disclosure easily and may engage in greenwashing without making meaningful and genuine sustainable efforts, yet still benefit from enhanced credibility, stronger market positioning and growth. Smaller firms may also replicate standard ESG practices without real commitment towards sustainability, providing vague and incomplete disclosures making it harder for stakeholders and investors to trust these signals.

As a result, ESG disclosure levels can signal trust and credibility, but risks like greenwashing pose challenges like reliability and fairness.

2.3.2 Institutional Theory

Institutional Theory (DiMaggio & Powell, 1983) suggests that organizations often adopt practices, follow rules, and standards set by either the industry, government or stakeholders to fit in with expectations, due to external pressure and avoid criticism. However, this may not directly improve a firm's efficiency or performance. In the context of ESG and sustainability, some firms may adopt sustainable business practices or take initiatives not only to increase performance and achieve strategic goals but rather align themselves with evolving stakeholder expectations, mandatory regulatory requirements, and established industry practices to maintain a competitive advantage (Ioannou & Serafeim, 2019).

As outlined by DiMaggio and Powell (1983), there are three main types of institutional pressures which may drive ESG disclosure by companies:

1. Coercive Pressure: government laws and regulations mandating ESG reporting (Christensen et al., 2013; Ioannou & Serafeim, 2019)
2. Normative Pressure: adopting best industry ESG practices to meet stakeholder expectations (Eccles et al., 2014; Bansal & Clelland, 2004)
3. Mimetic Pressure: firms copying industry leaders' best practices and initiatives to gain legitimacy (Hawn & Ioannou, 2016; Marquis et al., 2011)

As ESG disclosure becomes mandatory, firms may disclose more ESG-related information to meet stakeholder expectations and appear legitimate within their

industry, leading to isomorphism (Christensen et al., 2013), posing risks such as becoming increasingly similar to one another as they follow the same regulations and practices. Interestingly,

While institutional pressures drive ESG disclosure compliance, the true purpose such as addressing climate change and corporate accountability may be lost due to lack of meaningful impact or genuine intent to work towards environmental action (Talbot & Boiral, 2018).

Moreover, as discussed in the last section, smaller firms may lack resources and capital to keep up with the ever-changing demands of ESG disclosures (McKinsey & Company, 2023; Berliner & Prakash, 2015). This raises questions whether ESG disclosures reflect genuine sustainability efforts or mere compliance with the regulations.

Thus, institutional theory explains ESG disclosure being adopted across firms as a result of different types of pressures but not necessarily focussing on its quality or impact, highlighting the need for stronger accountability and regulatory frameworks to ensure real sustainability efforts and initiatives.

2.3.3 Stakeholder Theory

Economist Milton Friedman (1970) argued that the social responsibility of a business is to increase its profits and maximise shareholder returns instead of engaging in social initiatives and activities. More than a decade later, Freeman (1984) introduced the stakeholder theory. He argued that a company's success also depends on effectively

managing relationships with a wide range of stakeholders including primary and secondary stakeholders (Clarkson, 1995), laying the foundation for integrating responsibility, ethics into corporate decision-making, challenging the shareholder-centric model.

When analysing corporate sustainability through ESG disclosures, the stakeholder theory can explain why firms engage in ESG disclosures and reporting, i.e, to address the concerns, expectations, and values of their stakeholders. Therefore, disclosures act as a signalling tool to demonstrate sustainability commitment, legitimacy, ethical conduct, accountability, transparency, trust-building and risk management.

By aligning themselves with the regulatory frameworks and disclosing their sustainability efforts, firms can improve their reputation, strengthen stakeholder relationships, reduce conflict, and indirectly contribute to better financial performance through loyalty, lower operational risk, and reputational capital (Eccles et al., 2014, Clark et al., 2015). The theory treats ESG reporting as an ethical duty and not just as business strategies or regulatory requirement, which show that a firm is accountable and responsive to its stakeholder. Firms like Unilever and Patagonia focus on ESG practices, strengthening brand loyalty in society, building trust and long-term stakeholder relationships (Kiron et al., 2017).

However, Mitchell, Agle, and Wood (1997) critique the theory by introducing the stakeholder salience model, suggesting that weaker or less vocal stakeholders may be overlooked and neglected by stakeholders who have more power, importance and are more likely to influence corporate decision-making. Hence, institutional investors

or regulators often shape and drive ESG reporting practices, overlooking concerns of local communities or environmental activists.

Furthermore, Liu et al. (2022) argues that if corporate objectives and goals align with stakeholder goals, the likelihood of ESG disclosure increases. The author differentiates between compliance and resistance strategies and emphasises that firms facing resource constraints often resort to implementing ESG practices without making meaningful change, raising concerns of greenwashing. Findings from Hawn et al. (2018), prove that firms are rewarded for appearing on sustainability indices by investors, even if there is no improvement in ESG performance.

As highlighted by Freeman et al. (2021), the stakeholder theory needs to be complemented by frameworks such as the Resource-Based View (RBV) for guiding practical ESG implementation and needs to balance diverse stakeholder concerns, ensuring that ESG practices and disclosures, focus on making real impact and substantive change.

2.3.4 Agency Theory

Agency Theory offers a theoretical foundation to understand the governance-related challenges resulting from the separation between ownership and control in modern corporations. Jensen and Meckling (1976) suggest that managers (agents) might not align with the best interests of shareholders (principal) when they are given decision-making power, leading to agency challenges.

Addressing the agency problem, Eisenhardt (1989) suggests evaluating an agent's behaviour and performance to ensure alignment of their actions and shareholder's objectives. This helps in forming the basis of the agency theory, explaining firm practices like performance-based pay and bonuses. However, this has been widely criticised, as it overlooks social and ethical implications and mainly focuses on self-interest.

Findings by Prado-Lorenzo and Garcia-Sanchez (2010) and Jizi et al. (2014), suggest that ESG disclosures are used as mere monitoring tools, helping reduce agency costs and improving information transparency.

2.3.5 Legitimacy Theory

According to Dowling and Pfeffer (1975), an organisation can survive if it maintains legitimacy, by aligning its strategic goals and practices, with what the wider society sees as appropriate behaviour. When firms fail to align with accepted norms, they risk losing support and acceptance from the society. The author outlines how firms may communicate, collaborate and build strategic partnerships to maintain or gain legitimacy. Firms can have both advantages and disadvantages, and organisations need to adapt to ever-changing societal norms.

Suchman (1995) builds on this theory by introducing three forms of legitimacy: pragmatic (self-interest), moral (right, fair and ethical) and cognitive (actions and practices due to expectations and norms). He then builds on two main approaches towards legitimacy which is the strategic view, which explains that firms may use ESG disclosures as a way to improve their reputation and the institutional view which

emphasizes that legitimacy may be a result of following widely accepted behaviours and practices in society. (Hahn and Kühnen, 2013) argue that firms may use CSR campaigns and marketing to increase legitimacy, however if they are not supported by genuine evidence, they may risk looking as manipulative, consistent with Dowling and Pfeffer's (1975) theory. This is reinforced by Cahan et al. (2015) finding's, which provide cross-country evidence that firms may disclose more CSR and ESG information to preserve legitimacy, if they face pressure from the public.

Furthermore, Cho et al. (2015) argues that firms may use reporting as a means to protect their reputation and value, even if what they report is inconsistent with their actual performance, reinforcing Suchman's (1995) concepts.

2.4 The Role of Moderators and Mediators

The relationship between ESG disclosures and CFP has been widely explored, illustrating that there may not always be a direct effect, however recent studies have highlighted the importance of mediating and moderating factors to explain differences in ESG outcomes across firms, sectors, and countries.

Moderators, influence the strength or direction of ESG's impact on CFP across different settings. Key examples of moderating variables include the economic development level, that is whether the market is developed or developing. Previous literature proves that ESG may have stronger results and effects in developed markets compared to developing markets, as a result of better regulatory enforcement and stronger institutional frameworks (Wang et al., 2016). As a result, greater pressure

from stakeholders and society, may force firms to engage in ESG practices and activities, aligning with the legitimacy theory (section 2.3.5).

Likewise, the level of media accessibility and coverage in a given market is another moderator. Companies may use this to their advantage, making themselves more visible and valued by stakeholders, society and investors as they align themselves with ESG practices and disclosures. This aligns with the signalling theory (section 2.3.1), as firms benefit from positively signalling their efforts, values and performance even if the actual impact is difficult to measure.

Ownership structures also act as moderators, because family-controlled businesses may look at ESG and reporting as a strategy to maintain reputation. However, to reduce agency problems, public companies implement ESG strategies and frameworks to align with shareholder's goals/objectives, consistent with the agency theory (section 2.3.4) (Wang et al., 2016).

Finally, firms in sectors which are more environmentally intensive can influence their effectiveness of ESG strategies and efforts. This is evident in industries like energy and finance, where stakeholders may exert pressure for firms to take accountability of their actions and activities, aligning with the stakeholder theory (section 2.3.3).

On the other hand, mediators help in explaining why ESG affects CFP. Previous literature acknowledges two mediators: Institutional Investors and Reputational Capital. ESG disclosures and practices attract long-term investors, who overlook and contribute to better governance and in result improve CFP (Gillan et al., 2021). While

these investors may seek to benefit themselves, they help in improving the firm's quality, trust, reduce risk, and provide access to capital ultimately driving profitability and valuation (Benlemlih and Bitar, 2018).

These concepts are highly relevant and help in providing a theoretical base in understanding how ESG creates value, improves performance outcomes and how it can be effectively leveraged to enhance CFP. Ultimately, this underscores the need for approaching ESG and tailoring strategies between internal and external environments practically, to shape sustainability efforts for both financial and societal impact.

2.5 ESG Disclosure and Corporate Financial Performance (Empirical Evidence)

This section reviews the empirical evidence showing the impact of ESG disclosure on CFP, and focusses on four main areas: developed countries, developing countries, moderating factors, and disclosure quality. Although previous literature shows a positive relationship between ESG and CFP, the results are not consistent in all the countries, industries, and disclosure strategies.

2.5.1 Developed Economies (UK and Europe)

In the UK and Western Europe, studies have illustrated a positive and statistically significant relationship between ESG disclosure and CFP. Firms that have strong ESG practices, outperformed their competitors on accounting-based (ROA, ROE) and market-based metrics (Tobin's Q) especially when ESG was a part of their core strategy rather than complying to it (Friede et al., 2015; Capelle-Blancard & Petit,

2019; Clark et al., 2015). These findings help support the stakeholder and legitimacy theories, where firms with transparent ESG practices benefit from investor confidence, reputational capital, and risk mitigation.

Friede, Busch, and Bassen (2015), conducting Meta-analyses further validate this, by reviewing over 2000 empirical studies, finding that 63% of empirical studies show a positive ESG disclosure and CFP correlation in developed markets, having stable regulatory frameworks and higher investor awareness. Studies conducted on market reaction, demonstrated that investors positively valued firms that show strong ESG performance (Hawn et al., 2018; Eccles et al., 2014). Within the UK, Qiu, Shaukat and Tharyan (2016) found that market valuation improves in correlation with social disclosures by aligning with stakeholder expectations, thereby enhancing long-term shareholder value.

2.5.2 Developing Economies (India and Others)

In contrast, findings from emerging markets such as India, China, Turkey, and the Gulf are more mixed, resulting due to weaker regulatory enforcement, data inconsistencies, and problems with standardisation. Findings from India (Chelawat & Trivedi, 2016; Bodhanwala & Bodhanwala, 2018; Sapra et al., 2023) show that firms having strong ESG practices, tend to outperform firms with low ESG-performance on ROA, ROE, and Tobin's Q, only being true when disclosures are credible and aligned with sector relevance. Interestingly, Gartia et al. (2024) found that environmental and social disclosures enhance performance, but governance disclosures may add in additional costs and capital without short-term returns for firms.

Zhao et al. (2018) reported positive impacts of ESG on performance in energy sector firms in China, although financial benefits and investor reactions heavily depended on how clear, accurate and reliable the ESG disclosures were. In the Gulf and Turkey, studies show that firm size and ownership concentration play a critical role in driving ESG performance instead of genuine practices and efforts made by the firm, which is consistent with coercive and mimetic pressures outlined in the institutional theory (DiMaggio & Powell, 1983; Aras et al., 2010; Ebaid, 2023).

Overall, the impact of ESG disclosure on CFP in developing economies depends on how advanced the regulations are, how stringent the enforcement laws are for reporting and what the societal expectations are for a firm. This reinforces the need for stronger policies and institutions to be developed (Ioannou & Serafeim, 2012; Christensen et al., 2013; Wang et al., 2016).

2.5.3 Moderating Factors and Materiality

The relationship between ESG and CFP depends on various factors, also known as moderators. Firm size, industry, regulatory framework, ownership structure, and disclosed ESG practices all play an important role. Larger firms, due to access to more capital, market-visibility and stakeholder pressure, tend to benefit more from ESG practices as compared to SMEs (Liu et al., 2022; McKinsey & Company, 2023). Family-controlled firms may disclose ESG information for maintaining reputation, wheras publicly listed firms show stronger alignment with long-term shareholder interests, a possible explanation due to the agency theory (Benlemlih & Bitar, 2018; Jizi et al., 2014).

Empirical work by Khan, Serafeim and Yoon (2016) demonstrate that material ESG disclosures which are relevant to the firm's sector, help in increasing stock returns and sales growth. At the same time, immaterial disclosures either have no effect or can even erode firm value. This aligns with the signalling theory, investors using ESG disclosures as a signal of risk management and strategic objective (Spence, 1973; Dhaliwal et al., 2011; Connelly et al., 2011). Further studies also reveal that ESG impact increases during macro-economic conditions, such as financial crises or COVID-19, where stakeholder trust becomes a core value driver (Fang & Parida, 2022).

Sector is another key moderator. In environmentally intensive sectors like energy and mining, ESG practices directly influence stakeholders. For e.g., the positive market reaction to green bonds by firms in carbon-intensive sectors can be linked more to their signalling effect rather than cost-saving benefits (Tang & Zhang, 2020; Cormier & Magnan, 2007).

2.5.4 Disclosure Quality and Greenwashing

Although the volume of ESG reporting has increased, the quality, reliability, and consistency of disclosures needs to be focussed on. Poor-quality disclosures may lead to "*greenwashing*", where firms exaggerate their sustainability efforts for reputation rather than impact (Kim & Lyon, 2015; Bowen, 2014; Testa et al., 2018). This undermines the value of ESG disclosures as giving false information about sustainability practices may trigger negative investor reactions if exposed (Cho et al., 2015; Cahan et al., 2015).

Hence, ESG ratings help validate or challenge firm-level claims about their practices, affecting investor perception (Gillan et al., 2021). There is a strong need for global reporting standards especially for firms operating in multiple regions or countries (Marquis et al., 2011; Hawn & Ioannou, 2016).

The presence of third-party audits and integrated reporting frameworks (e.g., GRI, SASB, IFRS S1/S2) improves the credibility of ESG disclosures and its impact on firm value (Eccles et al., 2014; Verrecchia, 1983; Talbot & Boiral, 2018). Moreover, ESG disclosures are better when firms have strong internal boards, who are held responsible for being sustainable (Prado-Lorenzo & Garcia-Sanchez, 2010).

2.5.5 Conclusion

In conclusion, the empirical evidence above suggests that ESG disclosures can positively influence CFP, especially when it is reliable and strategically aligned with firm goals. However, this relationship is also based on the level of development of a country, the institutional environment, sector-specific risks, firm size, and disclosure quality. Developed economies with strong regulatory frameworks tend to see more consistent positive impact of ESG disclosure on CFP, while developing markets show mixed results shaped by limitations due to gaps in regulatory enforcement.

As the ESG landscape evolves, future research and regulations can measure disclosure quantity and evaluate disclosure quality to check alignment with real sustainability outcomes. This requires a deeper understanding and incorporation of theoretical perspectives like signalling, stakeholder, institutional, agency, and

legitimacy theory into disclosures and assessments to fully capture the different ways through which ESG generates corporate value.

2.6 Literature Gaps and Dissertation Contribution

In conclusion, ESG disclosures, framework and regulatory policies have received growing attention in both academic and regulatory contexts (Kotsantonis & Serafeim, 2019; Eccles & Klimenko, 2019). Although research has significantly increased in the recent years, there are several research gaps remaining in terms of theoretical understanding of the topic and its practical application. While there is well-documented evidence explaining the impact of ESG on CFP, it is only focussed on developed countries and few studies compare how these disclosures work under different regulatory systems, especially in developing countries (Grewal et al., 2020).

In particular, current literature lacks cross-country analysis and comparison of ESG disclosures between the UK, a developed country, having an investor-focussed approach and India, a developing economy, having the BRSR regulation which is transitioning from a CSR led model to an ESG-focussed framework. Moreover, an equally important question arises whether mandatory disclosures yield more meaningful outcomes than voluntary disclosures, given the recent regulatory shifts that mandate firms to publish their sustainability reports. This raises critical concerns whether voluntary disclosures over the past decade have failed to produce measurable environmental and climate-related impacts, or is it due to practices such as greenwashing and brownwashing practices? This remains insufficiently explored in the existing literature (Boiral, 2013; Amel-Zadeh & Serafeim, 2018).

Secondly, there is limited empirical research examining how ESG impact differs, depending on the industry. Previous literature treats all sectors equally, even though ESG risks and effects may be more pronounced in environmentally intensive sectors (Sullivan & Mackenzie, 2017). To add-on, more research is needed to evaluate how industry differences may change under stricter or relaxed ESG regulations in different countries.

Finally, many studies have used the overall ESG scores to find out the impact on CFP and whether there are any meaningful outcomes. However, this makes it hard for researchers, academics, leaders and policy makers to understand which aspects of the ESG score (E, S or G) actually have a stronger impact on CFP (Fatemi et al., 2018; Khan et al., 2016), limiting how useful the findings are for firms and regulators who want to focus on the more relevant areas.

Given these research gaps, this study aims to address the limitations in literature, provide theoretical insights with empirical evidence, and contribute to the broader academic understanding of ESG disclosures and its impact on CFP. The findings may offer useful insights for future research and ongoing discussions among academics, industry leaders, and policymakers as the ESG landscape evolves.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter outlines and explains the methodological framework implemented to understand whether ESG disclosures impact CFP, and whether its relationship varies in organisations by regulatory regime, sector and type of materiality in developed and developing countries. The chapter further presents the research questions, hypotheses being tested, data sources used, sampling design, and describes the independent, dependent and control variables used in the regression models along with its explanation for selection.

3.2 Research Questions and Hypotheses

The main aim of this research, as previously stated, is to examine whether ESG disclosures have an impact on CFP, more specifically to investigate whether such disclosures (now a mandatory requirement) that may involve additional reporting efforts, resource allocation and costs are associated with improved financial outcomes across sectors and regulatory frameworks in firms operating in the UK and India, representing developed and developing economies respectively. The following research questions have been developed in order to examine this link.

Research Question 1: Do ESG disclosure scores impact firm financial performance? (measured by ROA, ROE, Tobin's Q)

The hypothesis proposed is as follows:

Hypothesis 1: ESG disclosure scores have a positive and significant relationship with CFP.

(measured by ROA, ROE, Tobin's Q)

Implementing sustainability practices and adhering to regulatory frameworks such as the TCFD in the UK and BRSR in India, marks an important shift. These frameworks have made ESG disclosure mandatory in the post-pandemic period (SEBI, 2021) for organisations but pose additional reporting efforts, resource allocation and costs, especially if sustainability is not included in a firm's long-term strategic framework or objectives (Kotsantonis and Serafeim, 2019). These challenges may be amplified in developing economies due to resource constraints, cultural differences and politics which may affect the adoption and effectiveness of sustainability/ESG related practices and established disclosure frameworks. The study aims to investigate whether firms performed better when ESG reporting was voluntary versus when it was mandated for all firms depending on the country and year of enforcement. Hence, the following research question has been developed to examine whether regional and regulatory frameworks impact CFP.

Research Question 2: Does the ESG disclosure score and CFP relationship differ by region (UK vs. India) and enforcement period? (voluntary vs mandatory regulation) (measured by ROA, ROE, Tobin's Q)

The study seeks to evaluate the implications of these regulations in developed and developing countries and proposes the following hypothesis which is divided into two parts:

Hypothesis 2a: The ESG disclosure score and CFP relationship differs significantly between UK and Indian firms.

Hypothesis 2b: The relationship of ESG disclosure score and CFP differs under voluntary versus mandatory ESG reporting frameworks.

(measured by ROA, ROE, Tobin's Q)

Firms in environmentally intensive sectors face greater pressure to comply with regulatory frameworks and prioritise environmental goals within the SDG's by reducing emissions or improving resource-efficiency (Li et al., 2023). In contrast, firms in less environmentally intensive sectors focus on other aspects of the SDG's such as social equity or improving governance-related targets. In this context, the study examines whether the relationship between ESG disclosure scores and CFP differs across sectors, leading to the following research question:

Research Question 3: Does the ESG disclosure score and CFP relationship vary by sector (Energy, Financial and Consumer Goods)?

(measured by ROA, ROE, Tobin's Q)

The hypothesis proposed is as follows:

Hypothesis 3: The effect of ESG disclosure scores on CFP differs across sectors.

(measured by ROA, ROE, Tobin's Q)

Impact materiality, which focuses on the broader environmental and social outcomes of organisations actions, takes into consideration all the ESG related activities and practices of a firm which contribute directly to a firm's performance (Li et al.,2023). This study

investigates which one out of impact materiality (environmental + social scores) provides a stronger effect on CFP, helping formulate the following research question:

Research Question 4: Does impact materiality, measured through Environmental and Social disclosure scores, impact CFP?

(measured by ROA, ROE, Tobin's Q)

The hypothesis proposed is as follows:

Hypothesis 4a: Higher environmental disclosure is positively associated with CFP.

Hypothesis 4b: Higher social disclosure is positively associated with CFP.

(measured by ROA, ROE, Tobin's Q)

Table 3.1: Summary of Hypotheses

	Hypothesis *(measured by ROA, ROE, Tobin's Q)*
Hypothesis 1	*ESG disclosure scores have a positive and significant relationship with CFP*
Hypothesis 2a	*The ESG disclosure score and CFP relationship differs significantly between UK and Indian firms*
Hypothesis 2b	*The relationship of ESG disclosure score and CFP differs under voluntary versus mandatory ESG reporting frameworks*
Hypothesis 3	*The effect of ESG disclosure scores on CFP differs across sectors*

Hypothesis 4a	*Higher environmental disclosure is positively associated with CFP*
Hypothesis 4b	*Higher social disclosure is positively associated with CFP*

3.3 Data Selection and Sample Construction

3.3.1 Data and Country Selection

This study uses panel regression analysis, gathering firm-level data over a 10-year period (2013–2023). Since the analysis involves evaluating the relationship between ESG disclosure scores and CFP, selecting a reliable and methodologically appropriate ESG data source was essential. ESG databases differ significantly as some ratings are based on firm sustainability performance, while others focus on the level of ESG disclosure. As this research seeks to assess whether the level of ESG disclosure influences financial outcomes, it is important to use a source that focuses on disclosure-based scoring (Madison and Schiehll, 2021; Chatterji et al., 2015; Billio et al.,2021).

Therefore, the study uses the Bloomberg Terminal, which assigns ESG scores based on the firms' level of disclosure. These scores are compiled from publicly available information, such as annual/sustainability reports, company websites, and CSR practices. This aligns with the study's objective of determining whether variation in disclosure levels affect stakeholder expectations and in return improves CFP. Firms were selected based on their stock exchange listing on the Bloomberg Terminal.

The research focuses on two countries, the United Kingdom (UK) and India to examine the ESG disclosure level and CFP relationship across a developed and a developing economy (World Economic Situation and Prospects 2023, 2023). The sample includes firms from three sectors: Energy, Financial Services, and Consumer Goods.

The initial sample consisted of 60 firms, evenly split between the UK and India (30 firms each). Within each country, the sample was then divided by sector (10 firms per sector). Each sector was then further divided by firm size (5 firms per size), classified as large-cap firms (market capitalisation > £5 billion) and SMEs (≤ £5 billion). Firms were randomly selected within these criterias to ensure careful representation and reduce selection bias.

Following data cleaning procedures, firms with more than five years of missing data were excluded, resulting in a final sample of 53 firms and 583 firm-year observations. Fiscal year differences in reporting across firms were aligned to the calendar year to maintain consistency. The 10-year time frame captures both the voluntary and mandatory ESG disclosure periods, making this selection more appropriate and enabling the study to analyse the relationship of ESG disclosure level and CFP under changing regulatory periods and frameworks.

3.4 Variable Selection

3.4.1 Dependant Variables

This study focuses on three key financial metrics: Return on Assets (ROA), Return on Equity (ROE) and Tobin's Q incorporating market-based and accounting-based variables to conduct a proper and balanced analysis. This is consistent with previous studies and literature (Waddock and Graves, 1997; Rowe and Morrow Jr, 1999; McGuire et al., 1988).

Return on Assets (ROA) measures how efficiently a firm uses all its assets (equity and debt) to generate profits. This shows how well the company uses its assets to turn them into earnings. If a company uses its resources effectively to make money, it benefits from a higher ROA (Horrigan, 1965).

- ROA = net income before financing costs/total assets

Return on Equity (ROE), assesses how a firm uses just its shareholders' equity to create profits. It shows investors their return on investment. A firm taking on more debt, watches its equity get smaller (assets = equity + debt), increasing ROE even if profits do not change.

- ROE = net income/total equity of common shares

ROA takes both debt and equity into account, while ROE focuses on equity. Previous literature has used both ROA and ROE to measure financial performance.

Tobin's Q is another financial indicator used to measure a firm's market value with the cost to replace the assets. If the value of Tobin's Q is greater than 1, the firm is creating value and managing its resources well.

- Tobin's Q = market capitalisation/total assets

Data for ROA, ROE and Tobin's Q has been taken from the Bloomberg Terminal.

3.4.2 Independent Variables

This study uses ESG disclosure scores obtained from the Bloomberg Terminals to measure the impact on CFP and scores are lagged by one year since the effect of those ESG scores will not impact financial performance in the same, but rather during the next year. Moreover, Environment and Social scores are also used in the study to find the effect of impact materiality. These scores were then standardised (converted to z-scores), ensuring firms can be compared on a common scale over time (Pagkalou et al., 2024). This reduces the influence of outliers, minimising risk of multicollinearity, thereby improving the stability and accuracy of model (Aiken & West, 1991).

3.4.3 Control Variables

Control variables help ensure the results are accurate when conducting the regression analysis. To prevent omitted variable bias, the study uses leverage (debt-to-equity), firm size (measured through total assets), country, sector and year. Logarithm (log) of total assets was taken to reduce the effect of very large firms in the analysis, because using raw values could make the results uneven. This allows the study to compare firms of different sizes in a fair manner.

3.4.4 Moderating Variables

Several interaction variables were created, specifically between ESG scores and country, ESG scores and regulatory framework, and ESG scores and sector. This allowed the models to test the impact of ESG disclosure scores in changing regulatory environments, different countries and sectors. The ESG × Country interaction tests whether the ESG disclosure and CFP relationship differs between UK and Indian firms.

3.4.5 Dummy Variables

Dummy variables were created to account for categorical factors in the regression models. These included country dummy variables (UK = 1, India = 0), regulatory dummies (voluntary or mandatory), and sector dummies (Energy and Financials, with Consumer Goods as the reference group). Year dummies were added to see time-specific effects. Consumer Goods sector, India, and the year 2013 were used as reference categories for dummy variables.

TABLE 3.2: SUMMARY OF ALL VARIABLES

TYPE OF VARIABLE	VARIABLES USED
Dependant Variable	ROA, ROE, Tobin's Q
Independent Variables	ESG Disclosure Score, Environment Score, Social Score
Control Variables	Leverage (debt-to-equity), Firm Size (log of total assets), Country, Sector, Year

Moderating Variables	ESG scores x Country, ESG scores x Regulatory Framework, ESG scores x Sector
Dummy Variables	Country, Regulatory, Sector, Year

3.5 Regression Models and Diagnostic Tests

Panel data model is the most appropriate for the study and has been developed because the study observes 53 firms over 10 years. This helps in improving the accuracy of the analysis, because we can control specific factors which may not be taken into consideration by the independent variables.

3.5.1 Multicollinearity Test

Multicollinearity tests were conducted using the Variance Inflation Factor (VIF) to prevent high correlations among independent variables which could impact the regression results. If not accounted for, it can impact the coefficient estimates, making the model less reliable (Gujarati and Porter, 2009).

3.5.2 Hausman Test: Fixed Effects and Random Effects Model

The two common ways to conduct panel regressions are through the fixed effects and random effects model. The fixed effects model assumes each firm has unique characteristics which do not change over time; however, this might affect the results. In contrast, the random effects model treats firm-characteristics as random and do not relate to other variables in the model. The study uses the Hausman test (1978) results to determine which model is suitable for the relevant regression.

3.5.3 Heteroscedasticity Test

Regression models used the robust standard errors in Stata, allowing the model to ensure standard errors were valid even if heteroscedasticity is present. The Breusch-Pagan (1979) and White (1980) tests were conducted.

3.5.4 Regression Models

Research Question 1:

1. $ROA\_it = \alpha_0 + \beta_1 ESG\_it_{-1} + \beta_2 Size\_it_{-1} + \beta_3 Leverage\_it_{-1} + \beta_4 Sector\_it + \beta_5 Year\_t + \varepsilon\_it$

2. $ROE\_it = \alpha_0 + \beta_1 ESG\_it_{-1} + \beta_2 Size\_it_{-1} + \beta_3 Leverage\_it_{-1} + \beta_4 Sector\_it + \beta_5 Year\_t + \varepsilon\_it$

3. $\log (TobinQ\_it) = \alpha_0 + \beta_1 ESG\_it_{-1} + \beta_2 Size\_it_{-1} + \beta_3 Leverage\_it_{-1} + \beta_4 Sector\_it + \beta_5 Year\_t + \varepsilon\_it$

where:

- ESG_it_{-1}: standardised lagged ESG disclosure score
- Size: log of total assets
- Leverage: debt-to-equity ratio
- Sector and Year: dummy variables
- ε_it: error term.

Research Question 2:

1. $ROA_{it} = \alpha_0 + \beta_1 ESG_{it-1} + \beta_2 Country_i + \beta_3 (ESG_{it-1} \times Country_i) + \beta_4 Size_{it-1} + \beta_5 Leverage_{it-1} + \beta_6 Year_t + \varepsilon_{it}$

2. $ROE_{it} = \alpha_0 + \beta_1 ESG_{it-1} + \beta_2 Country_i + \beta_3 (ESG_{it-1} \times Country_i) + \beta_4 Size_{it-1} + \beta_5 Leverage_{it-1} + \beta_6 Year_t + \varepsilon_{it}$

3. $\log(TobinQ_{it}) = \alpha_0 + \beta_1 ESG_{it-1} + \beta_2 Country_i + \beta_3 (ESG_{it-1} \times Country_i) + \beta_4 Size_{it-1} + \beta_5 Leverage_{it-1} + \beta_6 Year_t + \varepsilon_{it}$

where:

- **ESG_it_{-1}**: Standardised lagged ESG disclosure score
- **Country_i**: Country dummy (1 = UK, 0 = India)
- **ESG × Country**: Interaction term testing whether ESG impact differs by country
- **$Size\_it_{-1}$**: Log of total assets (lagged and standardised)
- **$Leverage\_it_{-1}$**: Debt-to-equity ratio (lagged)
- **Year_t**: Year dummy variables (2014–2023)
- **ε_it**: Error term

Research Question 3:

1. $ROA_{it} = \alpha_0 + \beta_1 ESG_{it-1} + \beta_2 (ESG_{it-1} \times Energy_i) + \beta_3 (ESG_{it-1} \times Financials_i) + \beta_4 Size_{it-1} + \beta_5 Leverage_{it-1} + \beta_6 Country_i + \beta_7 Year_t + \varepsilon_{it}$

2. $ROE_{it} = \alpha_0 + \beta_1 ESG_{it-1} + \beta_2 (ESG_{it-1} \times Energy_i) + \beta_3 (ESG_{it-1} \times Financials_i) + \beta_4 Size_{it-1} + \beta_5 Leverage_{it-1} + \beta_6 Country_i + \beta_7 Year_t + \varepsilon_{it}$

3. $\log(\text{TobinQ\_it}) = \alpha_0 + \beta_1 \text{ESG\_it}_{-1} + \beta_2 (\text{ESG\_it}_{-1} \times \text{Energy\_i}) + \beta_3 (\text{ESG\_it}_{-1} \times \text{Financials\_i}) + \beta_4 \text{Size\_it}_{-1} + \beta_5 \text{Leverage\_it}_{-1} + \beta_6 \text{Country\_i} + \beta_7 \text{Year\_t} + \varepsilon\text{\_it}$

where:

- **ESG_it$_{-1}$**: Standardised lagged ESG disclosure score
- **ESG × Energy_i**: Interaction term for firms in the energy sector
- **ESG × Financials_i**: Interaction term for firms in the financial sector *(Consumer Goods sector is the reference group)*
- **Size_it$_{-1}$**: Log of total assets (lagged and standardised)
- **Leverage_it$_{-1}$**: Debt-to-equity ratio (lagged)
- **Country_i**: Country dummy (1 = UK, 0 = India)
- **Year_t**: Year dummy variables (2014–2023)
- **ε_it**: Error term

Research Question 4:

1. $\text{ROA\_it} = \alpha_0 + \beta_1 \text{EnvScore\_it}_{-1} + \beta_2 \text{SocScore\_it}_{-1} + \beta_3 \text{Size\_it}_{-1} + \beta_4 \text{Leverage\_it}_{-1} + \beta_5 \text{Country\_i} + \beta_6 \text{Year\_t} + \varepsilon\text{\_it}$

2. $\text{ROE\_it} = \alpha_0 + \beta_1 \text{EnvScore\_it}_{-1} + \beta_2 \text{SocScore\_it}_{-1} + \beta_3 \text{Size\_it}_{-1} + \beta_4 \text{Leverage\_it}_{-1} + \beta_5 \text{Country\_i} + \beta_6 \text{Year\_t} + \varepsilon\text{\_it}$

3. $\log(\text{TobinQ\_it}) = \alpha_0 + \beta_1 \text{EnvScore\_it}_{-1} + \beta_2 \text{SocScore\_it}_{-1} + \beta_3 \text{Size\_it}_{-1} + \beta_4 \text{Leverage\_it}_{-1} + \beta_5 \text{Country\_i} + \beta_6 \text{Year\_t} + \varepsilon\text{\_it}$

where:

- **EnvScore_it$_{-1}$**: Standardised lagged Environmental disclosure score

- **SocScore_it$_{-1}$**: Standardised lagged social disclosure score
- **Size_it$_{-1}$**: Log of total assets (lagged and standardised)
- **Leverage_it$_{-1}$**: Debt-to-equity ratio (lagged)
- **Country_i**: Country dummy (1 = UK, 0 = India)
- **Year_t**: Year dummy variables (2015–2023)
- **ε_it**: Error term

3.6 Ethical Considerations and Data Integrity

This research consists of secondary, publicly available firm-level data from Bloomberg Terminal, accessed under institutional license. No personal or confidential data were involved. All the data were anonymised and processed in accordance with the University of Edinburgh's ethical guidelines. Data cleaning and analysis were documented to ensure transparency and replicability.

3.7 Conclusion

This chapter outlines the methodology adopted to evaluate the relationship between ESG disclosures and CFP across regions, regulatory frameworks, and sectors. Using panel regression models, interaction effects, and robustness checks the above methodology helps conduct the empirical findings presented in Chapter 4.

CHAPTER 4

EMPIRICAL FINDINGS

4.1 Introduction

This chapter will present the empirical findings of the research conducted, following the models discussed in the methodology to perform the analyses needed to assess the impact of ESG disclosures on CFP. The discussion follows a structured format, we discuss regression outputs and findings, then we look at descriptive analysis and diagnostic tests performed for each research question. Several diagnostics and robustness tests were conducted to confirm the validity of the regression models. All models were estimated using robust standard errors in Stata to correct for potential heteroskedasticity. This ensured that coefficient estimates, and p-values remain valid. In addition, normality of residuals was assessed through graphs, and have been provided in the appendix.

4.2 Research Question 1: Do ESG disclosure scores impact firm financial performance?

4.2.1 Findings

Panel data regressions were performed using the Random Effects model, determined by the Hausman test results. The dependent variables used were Return on Assets (ROA), Return on Equity (ROE), and Tobin's Q. Moreover, models were estimated using robust standard errors in Stata to mitigate the effects of possible heteroskedasticity.

Table 4.1: EFFECT OF ESG DISCLOSURE SCORE ON CFP

	ROA		ROE		Tobin's Q	
	β	p-value	β	p-value	β	p-value
Lagged_ESG_std_new	-0.0056	0.319	0.0049	0.732	-0.26	0.289

Table 4.1 above illustrates that ESG disclosure scores were not statistically significant for any model. ESG disclosure score (β = -0.0056 and p-value = 0.319), had a negative coefficient, with the p-value exceeding the 0.05 significance level, meaning that the effect is not statistically reliable and the observed coefficient, may be due to random variation (Appendix 1).

While ESG disclosure score (β = 0.0049 and p-value = 0.732) had a small, yet positive coefficient, the p-value exceeded the 0.05 significance level indicating that it is statistically insignificant. Moreover, year effects showed a reduction in ROE in the year 2020, reflecting possible macroeconomic disruptions such as the COVID-19 pandemic in 2020 (Appendix 1).

Among all models, Tobin's Q had the most robust model fit, with an overall R^2 of 52.9%. ESG disclosure score (β = -0.26 and p-value = 0.289) had a negative coefficient but the p-value exceeded the 0.05 significance level, making it statistically insignificant. In contrast to the earlier models, firm size (calculated through log of total assets) was strong and significant, (β = -0.183 and p-value = 0.000) suggesting an inverse relationship. This negative relationship means that as firm size increases, the

market valuation of the company goes down, as investors tend to value larger firms lesser as compared to smaller firms (Appendix 1).

In all the models, sectoral differences were statistically significant at the 1% level (except in ROE where the financial industry had a p-value exceeding the 0.05 level), showing that firms in the energy and financial sectors performed worse than firms in the consumer goods industry.

In summary, there is not enough evidence to conclude whether ESG disclosure scores have an effect on ROA, ROE and Tobin's Q, since the observed p-values were greater than 0.005. Statistical significance was evaluated using p-values (Wasserstein and Lazar, 2016), which reflect the compatibility of observed data with the null hypothesis. Hence, we fail to reject the null hypothesis, indicating that the observed relationship is not statistically significant and may be due to random variation. This challenges the Stakeholder Theory (Freeman, 1984; Mitchell, Agle and Wood, 1997) and Legitimacy Theory (Dowling and Pfeffer, 1975), which argue that transparency and social responsibility should enhance firm performance. Since the findings determine there is no statistically significant relationship, ESG disclosure scores should have been standardisation to get the appropriate results. This highlights the importance of careful data preprocessing in multi-variable regressions, especially when variables differ in scale or units (Aiken and West, 1991; Gelman, 2008).

4.2.2 Descriptive Analysis and Diagnostic Tests

1. Descriptive Statistics:

Variable	Obs	Mean	Std. dev.	Min	Max
Lagged_ESG~w	583	-4.41e-10	1	-2.816409	2.30909
Return_on_~s	574	.0496971	.1037044	-1.163296	.460881
Return_on_~y	571	.1390127	.2607997	-2.986789	1.60564
log_Tobin_Q	583	.4977981	.7553497	-.8444353	3.227915

The average standardized ESG disclosure score was 0 with a standard deviation of 1, which confirms proper standardization.

ROA and ROE had low positive means (0.050 and 0.139), while Tobin's Q had a mean of 0.498, showing moderate market valuation with a few negative outliers.

2. Correlation Matrix:

	Lagged~w	Return~s	Return~y	log_To~Q
Lagged_ESG~w	1.0000			
Return_on_~s	-0.0678 0.1047	1.0000		
Return_on_~y	0.0076 0.8563	0.8535 0.0000	1.0000	
log_Tobin_Q	-0.1920 0.0000	0.6421 0.0000	0.5029 0.0000	1.0000

ESG disclosure had no significant correlation with ROA (r = –0.068, p = 0.105) or ROE (r = 0.008, p = 0.856). However, it showed a weak but statistically significant negative correlation with Tobin's Q (r = –0.192, p < 0.001), which may suggest a slight inverse relationship between ESG disclosure score and market valuation.

3. Multicollinearity Test

VIF tests showed all values were below 3 (mean VIF = 1.92). This confirms no multicollinearity across models. The highest VIF observed was 2.88 (Sector_Dummy3). VIF values such as 5 or even 2.5 may be used (O'Brien, 2007).

4. Hausman Test Results:

```
Test of H0: Difference in coefficients not systematic

   chi2(13) = (b-B)'[(V_b-V_B)^(-1)](b-B)
            =   2.87
Prob > chi2 = 0.9983
(V_b-V_B is not positive definite)
```

Hausman test results show that the model yields an insignificant Chi-squared statistic, with a p-value of 0.9983. Since the difference between Fixed Effects Model and Random Effects model is not statistically significant, Random Effects model was chosen.

4.3 Research Question 2: Does the ESG disclosure score and CFP relationship differ by region (UK vs. India) and enforcement period? (voluntary vs mandatory regulation)

4.3.1 Introduction

To investigate Research Question 2, panel data regressions were performed to test whether the relationship between ESG disclosure scores and CFP changes due to:

A. Region (UK vs. India) as both countries follow different regulatory frameworks such as the IFRS and BRSR. This will help us conclude whether there is a difference between developed and developing economies.
B. Different regulatory periods (voluntary vs. mandatory ESG reporting) to evaluate whether there is a difference in CFP, due to increased regulatory enforcement.

Accordingly, they help in evaluating Hypothesis 2a and Hypothesis 2b.

4.3.2 Findings: Model A (UK vs India)

This section provides the results for hypothesis 2a, using the Random Effects model, determined by the Hausman test results. The aim is to determine whether there is a difference in the ESG disclosure score and CFP between firms in the UK and India (developed vs developing economy). The dependent variables used were Return on Assets (ROA), Return on Equity (ROE), and Tobin's Q. An interaction term was created between the lagged ESG disclosure score and the country dummy variable.

Table 4.2: EFFECT OF ESG DISCLOSURE SCORE ON CFP (ESG × COUNTRY)

	ROA		ROE		Tobin's Q	
	β	p-value	β	p-value	β	p-value
Lagged_ESG_std_new	-0.01	0.839	0.008	0.552	-0.027	0.362
ESG_country_Interaction	0.006	0.455	0.03	0.273	0.015	0.676

The results above illustrate that ESG disclosure scores were statistically insignificant for any model. The ROA model showed a fit, with an overall R^2 of 14.69%. ESG disclosure score (β = -0.01 and p-value = 0.839), had a negative coefficient, with the p-value exceeding the 0.05 significance level, meaning that the effect is not statistically reliable and the observed coefficient, may be due to random variation (Appendix 2).

The ROE model showed a fit, with an overall R^2 of 10.4%. While ESG disclosure score (β = 0.008 and p-value = 0.552) had a small yet positive coefficient, the p-value exceeded the 0.05 significance level indicating that it is statistically insignificant. However, year effects showed a reduction in ROE in the year 2020, reflecting possible macroeconomic disruptions such as the COVID-19 pandemic (Appendix 2).

Overall, Tobin's Q had the most robust model fit, with an overall R^2 of 31.3%. ESG disclosure score (β = -0.027 and p-value = 0.362) had a negative coefficient but the p-value exceeded the 0.05 significance level, making it statistically insignificant.

The results also show that the interaction term in all the three models is statistically insignificant since the p-values are more than 0.05. Statistical significance was evaluated using p-values (Wasserstein and Lazar, 2016), which helps reflect the compatibility of observed data with the null hypothesis. Therefore, since all the results are statistically insignificant, we fail to reject the null hypothesis (hypothesis 2a) and these results may be due to random chance.

4.3.3 Descriptive Analysis and Diagnostic Tests

1. Descriptive Statistics:

Summary statistics: Mean, SD, Min, Max, N
Group variable: Country (Country)

Country	Lagged~w	Return~s	Return~y	log_To~Q
India	-.4623293	.0807265	.2037821	.823501
	.8959322	.1199004	.291356	.9261021
	-2.546647	-1.163296	-2.986789	-.2661815
	1.68878	.347996	1.232594	3.227915
	275	266	265	275
UK	.412794	.022899	.0829215	.206992
	.9038428	.0781591	.2164122	.3691794
	-2.816409	-.435605	-.754441	-.8444353
	2.30909	.460881	1.60564	1.241471
	308	308	306	308
Total	-4.41e-10	.0496971	.1390127	.4977981
	1	.1037044	.2607997	.7553497
	-2.816409	-1.163296	-2.986789	-.8444353
	2.30909	.460881	1.60564	3.227915
	583	574	571	583

Descriptive statistics show clear differences in ESG disclosure and financial performance when grouped by country. UK firms have higher standardized ESG scores (Mean = 0.413) compared to Indian firms (Mean = –0.462), which reflect stronger disclosure practices. Indian firms, however, showed higher average ROA (0.081 vs 0.023), ROE (0.204 vs 0.083), and log Tobin's Q (0.824 vs 0.207), suggesting stronger financial outcomes and higher market valuations compared to UK firms.

2. Multicollinearity Test

VIF tests showed all values were below 3 (mean VIF = 1.90). This confirms no multicollinearity across models. The highest VIF observed was 3.11 (Lagged_ESG_std_new). VIF values such as 5 or even 2.5 may be used (O'Brien, 2007).

3. Hausman Test Results:

```
   chi2(14) = (b-B)'[(V_b-V_B)^(-1)](b-B)
            =   5.28
Prob > chi2 = 0.9816
(V_b-V_B is not positive definite)
```

Hausman test results show that the model yields an insignificant Chi-squared statistic, with a p-value of 0.9816. Since the difference between Fixed Effects Model and Random Effects model is not statistically significant, Random Effects model was chosen.

4. T-Test Results: Regional Comparison

A series of independent two-sample t-tests were conducted to assess difference in CFP and ESG disclosure levels. The results showed that Indian firms outperformed UK firms in terms of both financial performance and ESG disclosure over the period of study.

4.3.4 Findings: Model B (ESG × REGULATION)

This section presents the results for hypothesis 2b, which focuses on exploring the interaction between ESG disclosure scores and specific regulatory regulations. More precisely, the models test whether there is a positive, negative or no effect of ESG disclosure scores on CFP under voluntary and mandatory disclosure regulations. Interaction terms were created between ESG disclosure scores and voluntary/mandatory regulatory dummy variables, resulting in two further regression models being developed. Random effects model was chosen after conducting the Hausman test, and the results are presented below.

TABLE 4.3: EFFECT OF ESG DISCLOSURE SCORE ON CFP (ESG × VOLUNTARY & MANDATORY REGULATION)

Voluntary Regulation (IFRS and BRSR)						
	ROA		ROE		Tobin's Q	
	β	p-value	β	p-value	β	p-value
Lagged_ESG_std_new	-0.015	0.139	-0.057	0.186	-0.088	0.073
ESG_Voluntary_Interaction	0.0125	0.22	0.06	0.132	0.079	0.122
Mandatory Regulation (IFRS and BRSR)						
	ROA		ROE		Tobin's Q	
	β	p-value	β	p-value	β	p-value
Lagged_ESG_std_new	-0.003	0.546	-0.002	0.9	-0.022	0.372
ESG_Mandatory_Interaction	0.012	0.187	0.029	0.3	0.014	0.533

The results from the table above indicate that lagged ESG disclosure scores and the interaction variables created are statistically insignificant across all models (ROA, ROE, and Tobins Q), since the p-values exceed the 0.05 level. Statistical significance was evaluated using p-values (Wasserstein and Lazar, 2016), which reflect the compatibility of observed data with the null hypothesis. Therefore, we fail to reject the null hypthesis (hypothesis 2b) as the results provide no evidence that voluntary or

mandatory regulations have an impact on the ESG disclosure score and CFP relationship.

4.3.5 Descriptive Analysis and Diagnostic Tests (Voluntary Regulation)

1. Descriptive Statistics:

Summary statistics: Mean, SD, Min, Max, N
Group variable: Regulatory_Dummy_Voluntary (Regulatory_Dummy_Voluntary)

Regulatory_Dummy_Voluntary	Lagged~w	Return~s	Return~y	log_To~Q
0	.0659019	.0313265	.0890868	.3474429
	.4790041	.0591344	.141856	.4137272
	-1.069045	-.140135	-.25533	-.4391253
	1.729173	.210344	.489594	1.232444
	56	56	56	56
1	-.0070029	.0516831	.1444416	.5137751
	1.040174	.1072706	.2701342	.781496
	-2.816409	-1.163296	-2.986789	-.8444353
	2.30909	.460881	1.60564	3.227915
	527	518	515	527
Total	-4.41e-10	.0496971	.1390127	.4977981
	1	.1037044	.2607997	.7553497
	-2.816409	-1.163296	-2.986789	-.8444353
	2.30909	.460881	1.60564	3.227915
	583	574	571	583

Descriptive statistics across the voluntary regulation period (Table 4.9) shows moderate changes in both ESG disclosure and CFP. Before the voluntary ESG disclosure framework, firms had a slightly higher average standardized ESG score (Mean = 0.066), compared to the post-voluntary period (Mean = –0.007), though the post-regulation period exhibited greater variation (SD = 1.04). Financial outcomes including ROA, ROE, and Tobin's Q improved after the voluntary framework came into effect. ROA increased from 0.031 to 0.052, while ROE rose from 0.089 to 0.144. Tobin's Q showed a similar trend, rising from 0.347 to 0.514, indicating higher market valuation following the voluntary ESG phase.

2. Multicollinearity Test

VIF tests showed all values were above 8 (mean VIF = 8.22). This confirms no multicollinearity across models. The highest VIF values were observed for Lagged

ESG disclosure score (47.04) and ESG Voluntary dummy (46.91), indicating a high degree of dependency between the two. However, all other variables, including controls and year dummies, remained well below the critical threshold of 10. VIF values such as 5 or even 2.5 may be used (O'Brien, 2007).

3. Hausman Test Results:

```
   chi2(15) = (b-B)'[(V_b-V_B)^(-1)](b-B)
            =   3.54
Prob > chi2 = 0.9989
(V_b-V_B is not positive definite)
```

Hausman test results show that the model yields an insignificant Chi-squared statistic, with a p-value of 0.9989. Since the difference between the Fixed Effects Model and the Random Effects model is not statistically significant, the Random Effects model was chosen.

4.3.6 Descriptive Analysis and Diagnostic Tests (Mandatory Regulation)

1. Descriptive Statistics:

Summary statistics: Mean, SD, Min, Max, N
Group variable: Regulatory_Dummy_Mandatory (Regulatory_Dummy_Mandatory)

Regulatory_Dummy_Mandatory	Lagged~w	Return~s	Return~y	log_To~Q
0	-.1528295	.0509338	.1378439	.5502227
	.9537751	.1092284	.2686542	.7902981
	-2.816409	-1.163296	-2.986789	-.8444353
	2.161247	.347996	1.232594	3.227915
	474	466	464	474
1	.6645979	.0443608	.1440813	.2698232
	.925476	.0755512	.2246369	.5241584
	-1.635243	-.239969	-.462448	-.3719336
	2.30909	.460881	1.60564	2.464134
	109	108	107	109
Total	-4.41e-10	.0496971	.1390127	.4977981
	1	.1037044	.2607997	.7553497
	-2.816409	-1.163296	-2.986789	-.8444353
	2.30909	.460881	1.60564	3.227915
	583	574	571	583

Table 4.10 compares descriptive statistics before and after the introduction of mandatory ESG reporting. As expected, average standardized ESG disclosure scores increased substantially after regulation was enforced (from –0.153 to 0.665), indicating improved transparency. However, financial outcomes did not follow the same trend. ROA declined slightly from 0.050 to 0.045, while ROE remained relatively stable (0.138 to 0.144). Notably, Tobin's Q dropped from 0.550 to 0.270, suggesting a possible decrease in market valuation during the mandatory disclosure period. These descriptive trends justify the need for regression-based analysis to isolate the effect of regulation.

2. Multicollinearity Test

VIF tests showed all values were below 3 (mean VIF = 2.1). This confirms no multicollinearity across models. The highest VIF observed was 3.9 (Regulatory_Dummy_Mandatory). VIF values such as 5 or even 2.5 may be used (O'Brien, 2007).

3. Hausman Test Results:

```
   chi2(15) = (b-B)'[(V_b-V_B)^(-1)](b-B)
            =  13.45
Prob > chi2 = 0.5678
(V_b-V_B is not positive definite)
```

Hausman test results show that the model yields an insignificant Chi-squared statistic, with a p-value of 0.5678. Since the difference between the Fixed Effects Model and the Random Effects model is not statistically significant, the Random Effects model was chosen.

4. One-Way ANOVA Test Results:

In order to evaluate whether financial performance differed by ESG regulatory phase, one-way ANOVA tests were conducted for each financial metric across both the voluntary and mandatory ESG regulation periods. The findings suggested that Voluntary ESG regulation has statistically insignificant impact on ROA, ROE, and Tobin's Q because the p-values were greater than 0.05. Therefore, we fail to reject the null hypothesis.

However, mandatory ESG regulation did have a statistically significant impact on Tobin's Q, as the p-value was less than the 0.05 level. While the R-squared value was only 2.1%, the results suggest that firm valuation may have been possibly impacted by the implementation of mandatory ESG disclosure frameworks.

4.4 Research Question 3: Does the ESG disclosure score and CFP relationship vary by sector (Energy, Financial and Consumer Goods)?

4.4.1 Findings: ESG × Sector

This section focusses on research question 3, exploring whether the relationship between ESG disclosure scores and CFP vary by sector. The analysis was done using the random effects model and interaction terms were made between ESG and sector dummy variables. Consumer goods sector was taken as the reference group allowing to test Hypothesis 3. The results are summarised below in Table 4.x:

TABLE 4.4: EFFECT OF ESG DISCLOSURE SCORE ON CFP (ESG × SECTOR)

	ROA		ROE		Tobin's Q	
	β	p-value	β	p-value	β	p-value
Lagged_ESG_std_new	-0.016	0.183	-0.017	0.673	-0.09	0.038
ESG_Energy	0.028	0.028	0.065	0.152	0.085	0.083
ESG_Financial	0.019	0.059	0.033	0.393	0.124	0.01

The regression results show that the ESG disclosure score was statistically reliable only for the Tobin's Q model (β = –0.09, p-value = 0.038), suggesting that there is a negative association which means that higher ESG disclosure scores may result in lower market valuation. However, it is important to note that these scores are for the entire dataset (sectors are taken together), which may explain why there is a negative association. It could also mean that investors are sceptical about the costs that arise with ESG reporting and compliance, explaining the result achieved.

However, in terms of ROE, all variables and interaction terms were statistically insignificant as the p-values were greater than 0.05. A possible explanation for this could be due to ROE's sensitivity to financing decisions and dividend policies, which may not directly impact it, unlike ROA and Tobin's Q. Despite this, because these findings are not statistically reliable, there is not enough evidence to conclude whether ROE is impacted by ESG disclosure scores or by sector differences. Statistical significance was evaluated using p-values (Wasserstein and Lazar, 2016), which reflect the compatibility of observed data with the null hypothesis.

The interaction variable, ESG_Energy had a positive coefficient and is statistically significant (β = 0.028, p-value = 0.028), meaning that the relationship is stronger in the energy sector, compared to the consumer goods sector on ROA. The findings suggest that stakeholders may value sustainability more and acceptable ESG practices in environmentally intensive industries may be financially rewarded. In contrast, ESG_Financial interaction variable was statistically marginally insignificant (β = 0.019, p-value = 0.059). Although there is a weak effect, the p-value is slightly greater than the acceptable value and future studies can focus on exploring it further.

Another important observation is that the interaction variable, ESG_Financial recorded a positive coefficient and is statistically significant (β = 0.124, p-value = 0.010) which suggests that higher ESG disclosure in the financial sector is associated with higher Tobin's Q ratio compared to the firms in the consumer goods sector. This reflects that institutional investors in the financial industry prefer firms with clear ESG disclosures as firms in this sector may face higher reputational risks. This validates our findings above, as we discussed earlier that the negative association between ESG disclosure scores and Tobin's Q may be due to combining all sectors, as the financial sector shows a clear, significant and positive relationship which highlights the need for a sector-specific analysis.

These findings reveal that ESG factors may be valued differently across sectors, aligning with the materiality framework and proven by frameworks and governing bodies such as SASB and sector-specific ESG priorities outlined in the BRSR and IFRS.

Therefore, we reject the null hypothesis as ESG_Financial interaction term is statistically significant at the 5% level in the Tobin's Q model, along with ESG_Energy in the ROA model, proving that ESG disclosure scores effect on CFP differs across sectors, supporting the hypothesis.

4.4.2 Descriptive Analysis and Diagnostic Tests

1. Descriptive Statistics:

Sector	Mean ESG score	ROA	ROE	Tobin's Q
Energy	0.192	0.024	0.078	0.189
Financial	-0.229	0.007	0.08	0.189
Consumer Goods	0.016	0.121	0.265	1.239

Descriptive statistics across sectors (Table 4.11) reveal substantial variation in both ESG disclosure and financial outcomes. Firms in the Consumer Goods sector reported relatively balanced ESG scores (Mean = 0.016) and the highest average financial performance, with ROA of 0.121, ROE of 0.265, and Tobin's Q of 1.239. Energy firms showed higher ESG disclosure (Mean = 0.192), but significantly lower financial outcomes (ROA = 0.024, ROE = 0.078, Tobin's Q = 0.189). In contrast, financial sector firms exhibited negative ESG scores (Mean = –0.229), with the lowest ROA and Tobin's Q, though ROE was slightly higher than Energy. These patterns support testing ESG-sector interaction effects in the regression models, as sector affiliation appears to moderate both ESG activity and firm performance.

2. Multicollinearity Test

VIF tests showed all values were below 3 (mean VIF = 2.05). This confirms no multicollinearity across models. The highest VIF observed was 4.97 (Lagged_ESG_std_new). VIF values such as 5 or even 2.5 may be used (O'Brien, 2007).

3. One-Way ANOVA Test Results:

One-way ANOVA tests showed statistically significant differences in ROA, ROE, and Tobin's Q across sectors (as p-value < 0.001), confirming there are sector differences in financial performance. However, Bartlett's test indicated there are unequal variances, therefore, interpretation must be made with caution. Tukey post-hoc tests were not applied, as sector moderation was fully analysed through ESG × sector interaction regressions.

4.5 Research Question 4: Does impact materiality, measured through Environmental and Social disclosure scores, impact corporate financial performance?

4.5.1 Findings: Impact Materiality

This section explores the final research question, investigating whether impact materiality, which is measured through only Environmental and Social scores, impact CFP. The analysis was conducted using a random effects model, standardising the environmental and social scores on three different models measuring financial

performance. The objective of this research question is to evaluate whether higher levels of environmental or social disclosure scores impact CFP. The results are presented below:

TABLE 4.5: EFFECT OF IMPACT MATERIALITY ON CFP

	ROA		ROE		Tobin's Q	
	β	p-value	β	p-value	β	p-value
Env_std	0.012	0.032	0.055	0.005	-0.003	0.904
Soc_std	-0.01	0.299	-0.046	0.124	-0.016	0.643

The results from Table 4.x show that environmental disclosures have a statistically positive and significant impact on both ROA (β = 0.012, p-value = 0.032) and ROE (β = 0.055, p-value = 0.005).

This suggests that firms with higher environmental disclosure scores tend to demonstrate superior accounting-based performance, potentially reflecting enhanced operational efficiency, regulatory compliance, and stakeholder trust.

However, no statistically significant relationship was found between environmental disclosures and Tobin's Q (β = -0.003, p-value = 0.904). This may suggest that market valuation does not immediately factor in environmental practices and initiatives.

Social disclosure scores showed negative coefficients and statistically insignificant results over all the three models. This underscores the need to understand the complexity of ESG disclosures as environmental scores and practices may be valued and impact CFP more than social factors. Statistical significance was evaluated using p-values (Wasserstein and Lazar, 2016), which reflect the compatibility of observed data with the null hypothesis.

Thus, the findings above provide evidence in support of Hypothesis 4a, because environmental scores are statistically significant and positive with both ROA and ROE. On the other hand, we fail to reject the null hypothesis for hypothesis 4b, as the results are not statistically significant, having p-values exceeding the 0.05 level, providing insufficient evidence to determine if social disclsure scores impact CFP.

4.5.2 Descriptive Analysis and Diagnostic Tests

1. Descriptive Statistics:

```
. summarize Env_std Soc_std Return_on_Assets Return_on_Common_Equity log_Tobin_Q

    Variable |        Obs        Mean    Std. dev.       Min        Max
-------------+---------------------------------------------------------
     Env_std |        503    3.70e-09           1  -1.329863   2.319657
     Soc_std |        503    2.54e-09           1  -2.074754   2.458285
Return_on_~s |        574    .0496971    .1037044  -1.163296    .460881
Return_on_~y |        571    .1390127    .2607997  -2.986789    1.60564
 log_Tobin_Q |        583    .4977981    .7553497  -.8444353   3.227915
```

Descriptive statistics for the RQ4 models are presented in Table 4.12. Both Environmental and Social disclosure scores were standardized prior to regression, resulting in means approximately equal to zero and standard deviations of one. The standardized Environmental scores ranged from –1.33 to 2.32, while social scores ranged more widely from –2.07 to 2.46, indicating higher variability across firms in

social disclosure practices. Financial outcomes exhibited patterns consistent with previous models: average ROA was 0.050, ROE was 0.139, and log-transformed Tobin's Q had a mean of 0.498. These values confirm comparability with earlier models and validate the inclusion of Environmental and Social scores as separate predictors.

2. Multicollinearity Test

VIF tests showed all values were below 3 (mean VIF = 2.15). This confirms no multicollinearity across models. The highest VIF observed was 4.49 (Soc_std). VIF values such as 5 or even 2.5 may be used (O'Brien, 2007).

CHAPTER 5

RESULTS & DISCUSSION

5.1 Overview

The main aim of this dissertation was to explore whether ESG disclosures influence corporate financial performance (CFP), focusing on sectoral, regulatory, and regional differences across the UK and India. Building on the theoretical foundations of the Signalling Theory, Institutional Theory, Stakeholder Theory, Agency Theory, and Legitimacy Theory, the study used a panel data regression model to examine 53 firms with 583 firm-year observations across two countries and three sectors from 2013-2023. The results demonstrate that ESG disclosures do not have a consistent impact across all performance measures but instead depends on the regulatory framework, sector differences and which part of ESG the firm focuses on environmental or social.

5.2 Discussion of Key Findings

The results obtained from the analysis for Research Question 1, demonstrate that the overall ESG disclosure score does not have a statistically significant effect on financial performance indicators: ROA, ROE and Tobin's Q. This aligns with previous literature that suggests using the aggregated ESG scores can hide the true impact of each pillar (E, S or G) on a firm's financial performance (Fatemi et al., 2018; Khan et al., 2016). Despite this, sector and firm size-based variables, helped explain the results well in some models. Notably, firm size (measured through log of total assets) showed a negative relationship with Tobin's Q, possibly suggesting that larger firms may experience lower market valuation from ESG practices and disclosure due to greenwashing or high costs that do not yield significant returns, consistent with findings by Bruna et al. (2022).

Research Question 2 analysed whether the impact of ESG disclosure on CFP, varies depending on regional and regulatory frameworks. There were no statistically significant differences between the UK and Indian firms, however descriptive statistics revealed that UK firms had on average, higher ESG disclosure scores, aligning with the findings that developed economies have a stronger regulatory environment, better data infrastructure, and greater market pressure from investors and stakeholders (Gregory et al., 2013). In contrast, Indian firms had outperformed UK firms in terms of financial metrics like ROA and Tobin's Q (Chelawat & Trivedi, 2016; Bodhanwala & Bodhanwala, 2018). Even though, the regression did not have a significant effect, the results show that firms in India operating under the new BRSR framework, may have strategically used sustainability disclosures for financial gains, aligning with the signalling theory (Spence, 1973; Dhaliwal et al., 2011). Findings from the regulation-based models (voluntary vs. mandatory) also indicate statistically insignificant results.

Results for Research Question 3 showed statistically significant and positive results, confirming that sector influences the relationship between ESG disclosure and CFP. Sector interaction regressions show that ESG disclosures in the financial sector significantly and positively impacted Tobin's Q, meaning that investors value transparent sustainability practices in high-impact industries. Similarly, the energy sector also showed a positive result with ROA. These sector-specific differences reinforce the SASB and BRSR frameworks' emphasis on materiality due to industry relevance, proving that ESG disclosures are impactful when tailored to sectoral risk and stakeholder expectations. This is consistent with the Stakeholder Theory, as firms in high-impact industries (e.g., energy, financial) who face greater stakeholder pressure and reputational risk, are more likely to follow ESG disclosure and practices

(Cormier & Magnan, 2007; Tang & Zhang, 2020; Gillan et al., 2021). This also aligns with the Materiality framework, which posits that not all ESG factors matter equally for every firm. For example, working towards reducing carbon emissions is more important for an energy firm than a technology company and by focussing on relevant ESG factors, important for the firm's sector, the effect on financial performance is much stronger (Khan, Serafeim & Yoon, 2016).

The final research question examined the role of impact materiality by isolating Environmental and Social scores from the overall ESG disclosure score. Results show a statistically significant positive effect of environmental disclosure score on ROA and ROE, but not on Tobin's Q. These findings are in line with the research design and findings of Khan, Serafeim, and Yoon (2016), who showed that environmental and social scores, are significantly associated with higher financial performance.

5.3 Theoretical Contributions

The findings from this research indicate that although ESG disclosures and reporting are increasingly being adopted and mandated across both developed and developing economies, it does not automatically lead to better financial performance and instead remains highly context dependent. The study highlights the need for disaggregated scores or pillar-specific analysis to determine the relationship between ESG disclosure and CFP. The findings suggest that firms may use ESG disclosures as a way to signal trust, improve reputation or meet stakeholder expectations. This matches the Legitimacy Theory, which argues that companies share sustainability information to gain public approval, manage how they are seen, especially when there is pressure from stakeholders and society (Dowling & Pfeffer, 1975; Suchman, 1995).

In a practical, real-world situation, what this means is that regulators and policymakers should not apply the same ESG rules and regulations to all industries, but rather create tailored rules that focus on real, measurable outcomes that prioritize material ESG issues depending on the sector and industry. This aligns with the principles of the Materiality Framework and follows standards like SASB and BRSR, which recognize that the financial relevance of ESG factors differs significantly across industries (Khan, Serafeim, & Yoon, 2016).

Firms should focus on making reliable, and meaningful sustainability efforts to prevent them from getting caught in mimetic isomorphism, where they simply imitate peers for legitimacy without making an actual impact, aligning with the Institutional Theory (DiMaggio & Powell, 1983).

Investors should focus beyond ESG disclosure scores and instead assess the quality of the disclosures being reported. Relying solely on ESG scores, may not be beneficial as scores are reflective of total performance and this may hide risks, making a firm seem like something which it is not. Hence, investors should take into consideration all the information that is present, instead of relying on just one (Kim & Lyon, 2015; Cho et al., 2015).

5.4 Limitations and Future Research

While the dissertation addresses multiple research gaps, there are some limitations to the study conducted. Continuous variables were not standardised, outliers in models were not winsorized, which could have resulted in the inaccuracy of some terms in the

model. Sectoral Anova test results were based on unequal variances and robust post hoc tests could have been applied. The fixed effects of sector and country were omitted, and stationarity was also not tested for. Lastly, while firm size was considered in the methodology, due to limited time constraints, its role was not formally tested. The study could also focus on two sets of secondary data instead of just relying on one.

Future research could incorporate the limitations and errors made in this study to achieve results and find the appropriate results. Mixed-method research could also be applied to check disclosure reliability through content analysis or interviews. While initially planned, due to time constraints, mixed-methods research could not be performed. As the ESG landscape continues to evolve, understanding the theoretical foundation is crucial in order to realise how ESG can support sustainable financial systems. Future research can play a key role by shaping more effective ESG practices and policies.

CHAPTER 6

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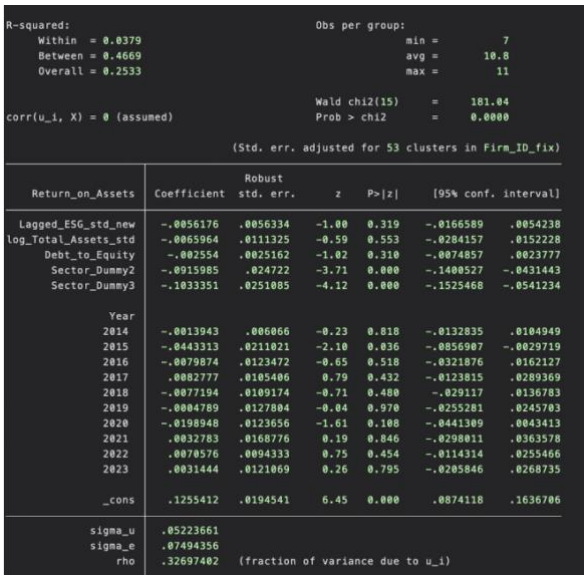
CHAPTER 7

APPENDICES

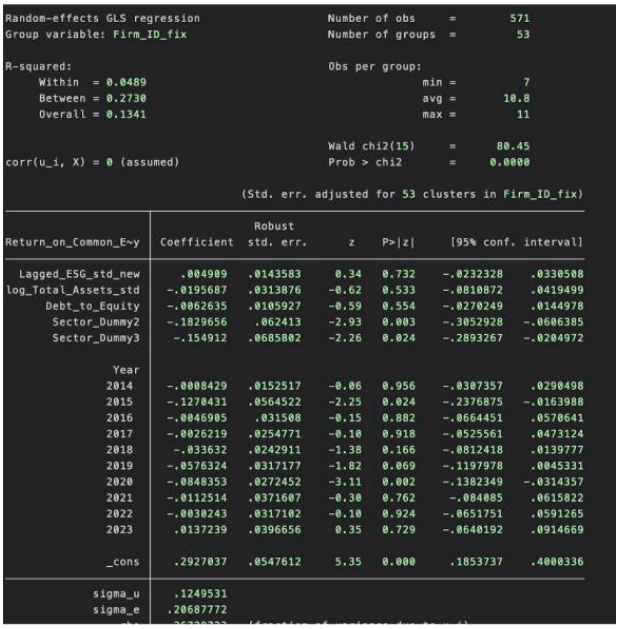
Appendix 1: Research Question 1

1. ROA:



```
R-squared:                                      Obs per group:
     Within  = 0.0379                                         min =         7
     Between = 0.4669                                         avg =      10.8
     Overall = 0.2533                                         max =        11

                                                Wald chi2(15)     =    181.04
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =    0.0000

                                (Std. err. adjusted for 53 clusters in Firm_ID_fix)
------------------------------------------------------------------------------
             |               Robust
Return_on_Assets | Coefficient  std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
Lagged_ESG_std_new |  -.0056176   .0056334    -1.00   0.319    -.0166589    .0054238
log_Total_Assets_std |  -.0065964   .0111325    -0.59   0.553    -.0284157    .0152228
      Debt_to_Equity |   -.002554   .0025162    -1.02   0.310    -.0074857    .0023777
       Sector_Dummy2 |  -.0915985    .024722    -3.71   0.000    -.1400527   -.0431443
       Sector_Dummy3 |  -.1033351   .0251085    -4.12   0.000    -.1525468   -.0541234
                     |
                Year |
                2014 |  -.0013943    .006066    -0.23   0.818    -.0132835    .0104949
                2015 |  -.0443313   .0211021    -2.10   0.036    -.0856907   -.0029719
                2016 |  -.0079874   .0123472    -0.65   0.518    -.0321876    .0162127
                2017 |   .0082777   .0105406     0.79   0.432    -.0123815    .0289369
                2018 |  -.0077194   .0109174    -0.71   0.480     -.029117    .0136783
                2019 |  -.0004789   .0127804    -0.04   0.970    -.0255281    .0245703
                2020 |  -.0198948   .0123656    -1.61   0.108    -.0441309    .0043413
                2021 |   .0032783   .0168776     0.19   0.846    -.0298011    .0363578
                2022 |   .0070576   .0094333     0.75   0.454    -.0114314    .0255466
                2023 |   .0031444   .0121069     0.26   0.795    -.0205846    .0268735
                     |
               _cons |   .1255412   .0194541     6.45   0.000     .0874118    .1636706
-------------+----------------------------------------------------------------
             sigma_u |  .05223661
             sigma_e |  .07494356
                 rho |  .32697402   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

2. ROE:



```
Random-effects GLS regression                   Number of obs     =        571
Group variable: Firm_ID_fix                     Number of groups  =         53

R-squared:                                      Obs per group:
     Within  = 0.0489                                         min =         7
     Between = 0.2730                                         avg =      10.8
     Overall = 0.1341                                         max =        11

                                                Wald chi2(15)     =     80.45
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =    0.0000

                                (Std. err. adjusted for 53 clusters in Firm_ID_fix)
------------------------------------------------------------------------------
             |               Robust
Return_on_Common_E~y | Coefficient  std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
Lagged_ESG_std_new |    .004909   .0143583     0.34   0.732    -.0232328    .0330508
log_Total_Assets_std |  -.0195687   .0313876    -0.62   0.533    -.0810872    .0419499
      Debt_to_Equity |  -.0062635   .0105927    -0.59   0.554    -.0270249    .0144978
       Sector_Dummy2 |  -.1829656    .062413    -2.93   0.003    -.3052928   -.0606385
       Sector_Dummy3 |  -.154912   .0685802    -2.26   0.024    -.2893267   -.0204972
                     |
                Year |
                2014 |  -.0008429   .0152517    -0.06   0.956    -.0307357    .0290498
                2015 |  -.1270431   .0564522    -2.25   0.024    -.2376875   -.0163988
                2016 |  -.0046905    .031508    -0.15   0.882    -.0664451    .0570641
                2017 |  -.0026219   .0254771    -0.10   0.918    -.0525561    .0473124
                2018 |   -.033632   .0242911    -1.38   0.166    -.0812418    .0139777
                2019 |  -.0576324   .0317177    -1.82   0.069    -.1197978    .0045331
                2020 |  -.0848353   .0272452    -3.11   0.002    -.1382349   -.0314357
                2021 |  -.0112514   .0371607    -0.30   0.762     -.084085    .0615822
                2022 |  -.0030243   .0317102    -0.10   0.924    -.0651751    .0591265
                2023 |   .0137239   .0396656     0.35   0.729    -.0640192    .0914669
                     |
               _cons |   .2927037   .0547612     5.35   0.000     .1853737    .4000336
-------------+----------------------------------------------------------------
             sigma_u |  .1249531
             sigma_e |  .20687772
                 rho |  .26730733   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

3. Tobin's Q:

```
R-squared:                                      Obs per group:
     Within  = 0.0987                                         min =         8
     Between = 0.5643                                         avg =      10.9
     Overall = 0.5291                                         max =        11

                                                Wald chi2(15)     =    107.22
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =    0.0000

                                 (Std. err. adjusted for 53 clusters in Firm_ID_fix)
------------------------------------------------------------------------------
             |               Robust
  log_Tobin_Q |  Coefficient  std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
Lagged_ESG_std_new |   -.026431   .0249035    -1.06   0.289    -.075241     .022379
log_Total_Assets_std |  -.1838564    .040727    -4.51   0.000   -.2636799   -.1040329
      Debt_to_Equity |  -.0017725   .0154902    -0.11   0.909   -.0321328    .0285878
       Sector_Dummy2 |  -.9901893   .2069253    -4.79   0.000   -1.395755   -.5846232
       Sector_Dummy3 |  -.9365871   .2067243    -4.53   0.000   -1.341759   -.5314149
                     |
                Year |
                2014 |  -.0495105   .0257535    -1.92   0.055   -.0999864    .0009653
                2015 |  -.0068557   .0409017    -0.17   0.867   -.0870215      .07331
                2016 |  -.0643473   .0446491    -1.44   0.150   -.1518579    .0231633
                2017 |  -.0105901   .0552337    -0.19   0.848   -.1188461    .0976659
                2018 |  -.0036117   .0572613    -0.06   0.950   -.1158417    .1086183
                2019 |   .0257036   .0589439     0.44   0.663   -.0898243    .1412315
                2020 |  -.0888779   .0591776    -1.50   0.133   -.2048638    .0271081
                2021 |  -.0093133   .0559058    -0.17   0.868   -.1188867    .1002602
                2022 |  -.0345838   .0611643    -0.57   0.572   -.1544636     .085296
                2023 |  -.0572021   .0613281    -0.93   0.351    -.177403    .0629987
                     |
               _cons |   1.187633   .1862635     6.38   0.000    .8225627    1.552702
------------------------------------------------------------------------------
```

Appendix 2: Research Question 2:

ROA:

```
Random-effects GLS regression                   Number of obs     =        573
Group variable: Firm_ID                         Number of groups  =         53

R-squared:                                      Obs per group:
     Within  = 0.0408                                         min =          7
     Between = 0.2562                                         avg =       10.8
     Overall = 0.1469                                         max =         11

                                                Wald chi2(15)     =     109.04
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000

                                 (Std. err. adjusted for 53 clusters in Firm_ID)
------------------------------------------------------------------------------
             |               Robust
Return_on_Assets |  Coefficient  std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
Lagged_ESG_std_new |  -.0010655    .005244    -0.20   0.839    -.0113437    .0092126
       Country_dummy |  -.0458153   .0190137    -2.41   0.016    -.0830816   -.0085491
ESG_Country_Interaction |   .0069041   .0092361     0.75   0.455    -.0111984    .0250066
log_Total_Assets_std |  -.0244699    .010596    -2.31   0.021    -.0452377   -.0037021
      Debt_to_Equity |  -.0037417   .0028294    -1.32   0.186    -.0092872    .0018038
                     |
                Year |
                2014 |  -.0003644   .0078254    -0.05   0.963     -.015702    .0149732
                2015 |  -.0421795   .0211594    -1.99   0.046    -.0836512   -.0007079
                2016 |  -.0073081   .0135533    -0.54   0.590     -.033872    .0192559
                2017 |   .0085559   .0110701     0.77   0.440    -.0131412     .030253
                2018 |  -.0081313   .0125064    -0.65   0.516    -.0326434    .0163809
                2019 |  -.0002192   .0134326    -0.02   0.987    -.0265466    .0261083
                2020 |  -.0198534   .0141609    -1.40   0.161    -.0476082    .0079014
                2021 |   .0024919   .0174362     0.14   0.886    -.0316825    .0366663
                2022 |    .005715   .0101919     0.56   0.575    -.0142608    .0256909
                2023 |   .0004625    .013147     0.04   0.972    -.0253051      .02623
                     |
               _cons |   .0841432   .0198978     4.23   0.000     .0451442    .1231422
------------------------------------------------------------------------------
```

ROE:

```
Random-effects GLS regression                   Number of obs     =        571
Group variable: Firm_ID                         Number of groups  =         53

R-squared:                                      Obs per group:
     Within  = 0.0517                                         min =          7
     Between = 0.1899                                         avg =       10.8
     Overall = 0.1041                                         max =         11

                                                Wald chi2(15)     =      83.75
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000

                                        (Std. err. adjusted for 53 clusters in Firm_ID)
------------------------------------------------------------------------------
                             |               Robust
Return_on_Common_Equity      | Coefficient  std. err.      z    P>|z|     [95% conf. interval]
-----------------------------+------------------------------------------------
     Lagged_ESG_std_new      |   .0082446   .0138607     0.59   0.552    -.018922    .0354111
           Country_dummy     |  -.1208158   .0394829    -3.06   0.002   -.1982007   -.0434308
ESG_Country_Interaction      |   .0305968   .0279196     1.10   0.273   -.0241246    .0853182
   log_Total_Assets_std      |  -.0401466   .0270242    -1.49   0.137    -.093113    .0128199
         Debt_to_Equity      |  -.0078813   .0112328    -0.70   0.483   -.0298972    .0141346
                             |
                        Year |
                        2014 |  -.0031066   .0210961    -0.15   0.883   -.0444541    .0382409
                        2015 |  -.1266047   .0550257    -2.30   0.021   -.2344531   -.0187564
                        2016 |  -.0073007    .032561    -0.22   0.823   -.0711192    .0565177
                        2017 |  -.0082473   .0291635    -0.28   0.777   -.0654068    .0489122
                        2018 |  -.0411653   .0278961    -1.48   0.140   -.0958407    .0135101
                        2019 |  -.0638611   .0351875    -1.81   0.070   -.1328274    .0051051
                        2020 |   -.092548   .0320012    -2.89   0.004   -.1552692   -.0298269
                        2021 |  -.0210274    .039645    -0.53   0.596   -.0987302    .0566754
                        2022 |  -.0153014   .0366455    -0.42   0.676   -.0871253    .0565225
                        2023 |   -.000462   .0419625    -0.01   0.991   -.0827071     .081783
                             |
                       _cons |   .2433905   .0474066     5.13   0.000    .1504752    .3363058
-----------------------------+------------------------------------------------
                     sigma_u |  .12969453
```

Tobin’s Q:

```
Random-effects GLS regression                   Number of obs     =        577
Group variable: Firm_ID                         Number of groups  =         53

R-squared:                                      Obs per group:
     Within  = 0.0987                                         min =          8
     Between = 0.3319                                         avg =       10.9
     Overall = 0.3138                                         max =         11

                                                Wald chi2(15)     =      67.60
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000

                                        (Std. err. adjusted for 53 clusters in Firm_ID)
------------------------------------------------------------------------------
                             |               Robust
          log_Tobin_Q        | Coefficient  std. err.      z    P>|z|     [95% conf. interval]
-----------------------------+------------------------------------------------
     Lagged_ESG_std_new      |  -.0273776   .0300249    -0.91   0.362   -.0862253    .0314702
           Country_dummy     |  -.5097382   .1729297    -2.95   0.003   -.8486741   -.1708023
ESG_Country_Interaction      |   .0156319   .0374054     0.42   0.676   -.0576813    .0889452
   log_Total_Assets_std      |  -.1987385   .0481021    -4.13   0.000   -.2930169     -.10446
         Debt_to_Equity      |   -.002998   .0158674    -0.19   0.850   -.0340975    .0281015
                             |
                        Year |
                        2014 |  -.0510888   .0312242    -1.64   0.102   -.1122872    .0101095
                        2015 |  -.0087574   .0453592    -0.19   0.847   -.0976598    .0801451
                        2016 |  -.0653534   .0486875    -1.34   0.179   -.1607792    .0300725
                        2017 |  -.0121504   .0590648    -0.21   0.837   -.1279152    .1036144
                        2018 |  -.0058652   .0607991    -0.10   0.923   -.1250293    .1132989
                        2019 |   .0244394   .0623026     0.39   0.695   -.0976715    .1465502
                        2020 |  -.0907217   .0634834    -1.43   0.153   -.2151469    .0337035
                        2021 |  -.0118707    .05976    -0.20   0.843   -.1289982    .1052568
                        2022 |  -.0378927   .064938    -0.58   0.560   -.1651688    .0893834
                        2023 |  -.0608671   .0641254    -0.95   0.343   -.1865505    .0648163
                             |
                       _cons |   .8015985    .160287     5.00   0.000    .4874416    1.115755
-----------------------------+------------------------------------------------
                     sigma_u |  .56493189
```

Section A.4: T-Tests

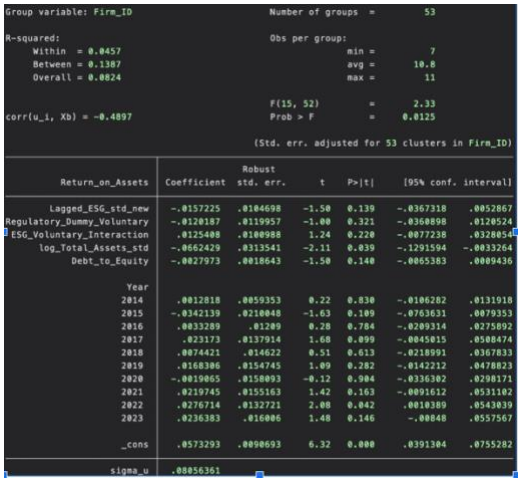
```
Two-sample t test with equal variances

   Group |     Obs        Mean    Std. err.   Std. dev.   [95% conf. interval]
---------+--------------------------------------------------------------------
       0 |     266    .0807265    .0073516    .1199004    .0662516    .0952014
       1 |     308     .022899    .0044535    .0781591    .0141357    .0316623
---------+--------------------------------------------------------------------
Combined |     574    .0496971    .0043285    .1037044    .0411954    .0581988
---------+--------------------------------------------------------------------
    diff |            .0578275    .0083447                .0414376    .0742175
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   6.9299
H0: diff = 0                                     Degrees of freedom =      572

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000
```

```
Two-sample t test with equal variances

   Group |     Obs        Mean    Std. err.   Std. dev.   [95% conf. interval]
---------+--------------------------------------------------------------------
       0 |     265    .2037821    .0178979     .291356    .1685414    .2390229
       1 |     306    .0829215    .0123715    .2164122    .0585773    .1072658
---------+--------------------------------------------------------------------
Combined |     571    .1390127    .0109141    .2607997    .1175759    .1604495
---------+--------------------------------------------------------------------
    diff |            .1208606    .0213099                .0790049    .1627163
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   5.6716
H0: diff = 0                                     Degrees of freedom =      569

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000
```

```
Two-sample t test with equal variances

   Group |     Obs        Mean    Std. err.   Std. dev.   [95% conf. interval]
---------+--------------------------------------------------------------------
       0 |     275     .823501    .0558461    .9261021    .7135591    .9334429
       1 |     308     .206992    .0210359    .3691794    .1655991    .2483848
---------+--------------------------------------------------------------------
Combined |     583    .4977981    .0312834    .7553497     .436356    .5592402
---------+--------------------------------------------------------------------
    diff |             .616509    .0572691                .5040293    .7289888
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  10.7651
H0: diff = 0                                     Degrees of freedom =      581

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000
```

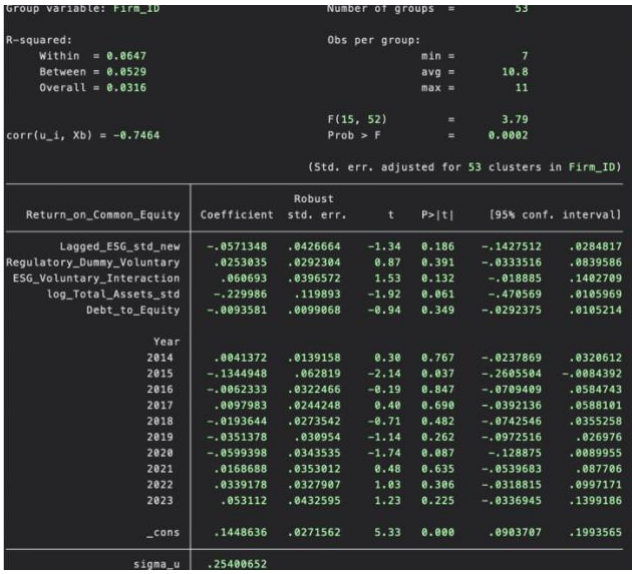
```
Two-sample t test with equal variances

   Group |     Obs        Mean    Std. err.   Std. dev.   [95% conf. interval]
---------+--------------------------------------------------------------------
       0 |     275   -.4623293    .0540267    .8959322   -.5686896   -.3559691
       1 |     308     .412794    .0515012    .9038428     .311454    .5141341
---------+--------------------------------------------------------------------
Combined |     583   -4.41e-10    .0414158           1   -.0813426    .0813426
---------+--------------------------------------------------------------------
    diff |           -.8751234    .0746781               -1.021795   -.7284514
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t = -11.7186
H0: diff = 0                                     Degrees of freedom =      581

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

Interaction Model (ESG × Voluntary Regulation) for ROA



```
Group variable: Firm_ID                         Number of groups   =        53

R-squared:                                      Obs per group:
     Within  = 0.0457                                         min =         7
     Between = 0.1387                                         avg =      10.8
     Overall = 0.0824                                         max =        11

                                                F(15, 52)          =      2.33
corr(u_i, Xb) = -0.4897                         Prob > F           =    0.0125

                                              (Std. err. adjusted for 53 clusters in Firm_ID)
------------------------------------------------------------------------------
                             |               Robust
      Return_on_Assets       | Coefficient  std. err.      t    P>|t|     [95% conf. interval]
-----------------------------+------------------------------------------------
     Lagged_ESG_std_new      |  -.0157225   .0104698    -1.50   0.139    -.0367318    .0052867
Regulatory_Dummy_Voluntary   |  -.0120187   .0119957    -1.00   0.321    -.0360898    .0120524
ESG_Voluntary_Interaction    |   .0125408   .0100988     1.24   0.220    -.0077238    .0328054
     log_Total_Assets_std    |  -.0662429   .0313541    -2.11   0.039    -.1291594   -.0033264
          Debt_to_Equity     |  -.0027973   .0018643    -1.50   0.140    -.0065383    .0009436
                             |
                        Year |
                        2014 |   .0012818   .0059353     0.22   0.830    -.0106282    .0131918
                        2015 |  -.0342139   .0210048    -1.63   0.109    -.0763631    .0079353
                        2016 |   .0033289     .01209     0.28   0.784    -.0209314    .0275892
                        2017 |    .023173   .0137914     1.68   0.099    -.0045015    .0508474
                        2018 |   .0074421    .014622     0.51   0.613    -.0218991    .0367833
                        2019 |   .0168306   .0154745     1.09   0.282    -.0142212    .0478823
                        2020 |  -.0019065   .0158093    -0.12   0.904    -.0336302    .0298171
                        2021 |   .0219745   .0155163     1.42   0.163    -.0091612    .0531102
                        2022 |   .0276714   .0132721     2.08   0.042     .0010389    .0543039
                        2023 |   .0236383    .016006     1.48   0.146    -.00848      .0557567
                             |
                       _cons |   .0573293   .0090693     6.32   0.000     .0391304    .0755282
-----------------------------+------------------------------------------------
                     sigma_u |  .08856361
------------------------------------------------------------------------------
```

Interaction Model (ESG × Voluntary Regulation) for ROE



```
Group variable: Firm_ID                         Number of groups   =        53

R-squared:                                      Obs per group:
     Within  = 0.0647                                         min =         7
     Between = 0.0529                                         avg =      10.8
     Overall = 0.0316                                         max =        11

                                                F(15, 52)          =      3.79
corr(u_i, Xb) = -0.7464                         Prob > F           =    0.0002

                                              (Std. err. adjusted for 53 clusters in Firm_ID)
------------------------------------------------------------------------------
                             |               Robust
  Return_on_Common_Equity    | Coefficient  std. err.      t    P>|t|     [95% conf. interval]
-----------------------------+------------------------------------------------
     Lagged_ESG_std_new      |  -.0571348   .0426664    -1.34   0.186    -.1427512    .0284817
Regulatory_Dummy_Voluntary   |   .0253035   .0292304     0.87   0.391    -.0333516    .0839586
ESG_Voluntary_Interaction    |    .060693   .0396572     1.53   0.132     -.018885    .1402709
     log_Total_Assets_std    |  -.229986    .119893     -1.92   0.061     -.470569    .0105969
          Debt_to_Equity     |  -.0093581   .0099068    -0.94   0.349    -.0292375    .0105214
                             |
                        Year |
                        2014 |   .0041372   .0139158     0.30   0.767    -.0237869    .0320612
                        2015 |  -.1344948    .062819    -2.14   0.037    -.2605504   -.0084392
                        2016 |  -.0062333   .0322466    -0.19   0.847    -.0709409    .0584743
                        2017 |   .0097983   .0244248     0.40   0.690    -.0392136    .0588101
                        2018 |  -.0193644   .0273542    -0.71   0.482    -.0742546    .0355258
                        2019 |  -.0351378    .030954    -1.14   0.262    -.0972516     .026976
                        2020 |  -.0599398   .0343535    -1.74   0.087     -.128875    .0089955
                        2021 |   .0168688   .0353012     0.48   0.635    -.0539683     .087706
                        2022 |   .0339178   .0327907     1.03   0.306    -.0318815    .0997171
                        2023 |    .053112   .0432595     1.23   0.225    -.0336945    .1399186
                             |
                       _cons |   .1448636   .0271562     5.33   0.000     .0903707    .1993565
-----------------------------+------------------------------------------------
                     sigma_u |  .25400652
------------------------------------------------------------------------------
```

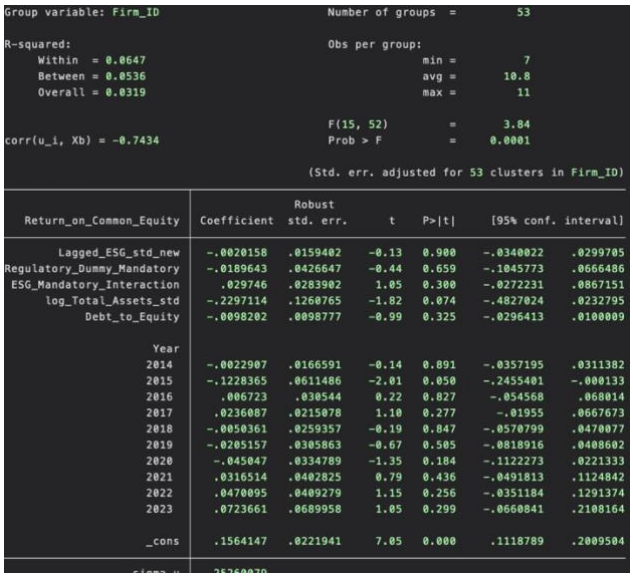
Interaction Model (ESG × Voluntary Regulation) for Tobin's Q

```
Random-effects GLS regression                   Number of obs     =        577
Group variable: Firm_ID                         Number of groups  =         53

R-squared:                                      Obs per group:
     Within  = 0.1875                                         min =          8
     Between = 0.2357                                         avg =       10.9
     Overall = 0.2263                                         max =         11

                                                Wald chi2(15)     =      99.32
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000

                                              (Std. err. adjusted for 53 clusters in Firm_ID)
------------------------------------------------------------------------------
             |               Robust
  log_Tobin_Q |      Coef.   Std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
Lagged_ESG_std_new |  -.0888167   .0496139    -1.79   0.073    -.1860583    .0084248
Regulatory_Dummy_Voluntary |  -.3159116   .0744505    -4.24   0.000    -.4618319   -.1699914
ESG_Voluntary_Interaction |   .0794285    .051385     1.55   0.122    -.0212843    .1801412
log_Total_Assets_std |  -.2281016   .0674629    -3.38   0.001    -.3603265   -.0958768
Debt_to_Equity |  -.0045756   .0122179    -0.37   0.708    -.0285223     .019371
             |
        Year |
        2014 |  -.0358167   .0279406    -1.28   0.200    -.0905793     .018946
        2015 |   .1715281   .0656767     2.61   0.009     .0428041     .300252
        2016 |   .1164349   .0638337     1.82   0.068    -.0086768    .2415466
        2017 |   .1699367   .0697201     2.44   0.015     .0332879    .3065855
        2018 |   .1756366   .0727019     2.42   0.016     .0331434    .3181298
        2019 |   .2060081   .0752957     2.74   0.006     .0584312     .353585
        2020 |   .0911049    .080871     1.13   0.260    -.0673994    .2496091
        2021 |    .169507   .0747022     2.27   0.023     .0230933    .3159207
        2022 |   .1436711   .0777541     1.85   0.065    -.0087242    .2960664
        2023 |   .1169304   .0754416     1.55   0.121    -.0309324    .2647932
             |
       _cons |   .6729184   .0978539     6.88   0.000     .4811282    .8647086
-------------+----------------------------------------------------------------
     sigma_u |  .56484033
------------------------------------------------------------------------------
```

Interaction Model (ESG × Mandatory Regulation) for ROA

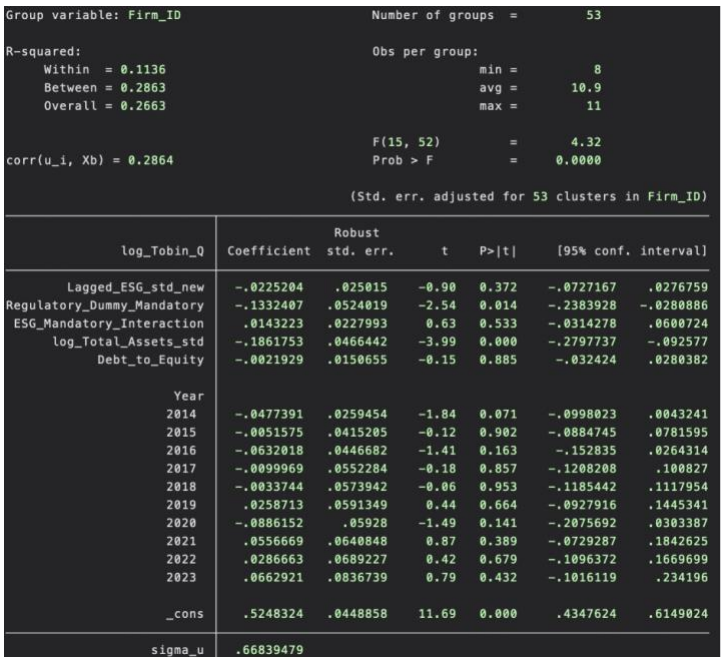
```
Random-effects GLS regression                   Number of obs     =        573
Group variable: Firm_ID                         Number of groups  =         53

R-squared:                                      Obs per group:
     Within  = 0.0440                                         min =          7
     Between = 0.1698                                         avg =       10.8
     Overall = 0.1041                                         max =         11

                                                Wald chi2(15)     =     121.62
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000

                                              (Std. err. adjusted for 53 clusters in Firm_ID)
------------------------------------------------------------------------------
             |               Robust
Return_on_Assets |      Coef.   Std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
Lagged_ESG_std_new |  -.0033753   .0055851    -0.60   0.546     -.014322    .0075714
Regulatory_Dummy_Mandatory |  -.0046184   .0110771    -0.42   0.677    -.0263291    .0170924
ESG_Mandatory_Interaction |   .0124261   .0094239     1.32   0.187    -.0060444    .0308966
log_Total_Assets_std |  -.0283176   .0114645    -2.47   0.014    -.0507877   -.0058475
Debt_to_Equity |  -.0040929   .0028258    -1.45   0.148    -.0096314    .0014456
             |
        Year |
        2014 |  -.0007227   .0063982    -0.11   0.910    -.0132629    .0118175
        2015 |   -.042957   .0211062    -2.04   0.042    -.0843243   -.0015897
        2016 |  -.0066083    .01227    -0.54   0.590     -.030657    .0174404
        2017 |   .0105161   .0101702     1.03   0.301    -.009417    .0304492
        2018 |  -.0055323   .0110197    -0.50   0.616    -.0271304    .0160659
        2019 |   .0025348   .0126263     0.20   0.841    -.0222123    .0272819
        2020 |  -.0164866   .0125356    -1.32   0.188    -.0410558    .0080827
        2021 |   .0046247   .0147868     0.31   0.754     -.024357    .0336064
        2022 |   .0077863   .0125651     0.62   0.535    -.0168407    .0324134
        2023 |   .0036915   .0203067     0.18   0.856    -.0361088    .0434918
             |
       _cons |   .0595611   .0133844     4.45   0.000     .0333282     .085794
-------------+----------------------------------------------------------------
     sigma_u |  .06202016
     sigma_e |  .07499873
------------------------------------------------------------------------------
```

Interaction Model (ESG × Mandatory Regulation) for ROE



```
Group variable: Firm_ID                         Number of groups  =        53

R-squared:                                      Obs per group:
     Within  = 0.0647                                         min =         7
     Between = 0.0536                                         avg =      10.8
     Overall = 0.0319                                         max =        11

                                                F(15, 52)         =      3.84
corr(u_i, Xb) = -0.7434                         Prob > F          =    0.0001

                                              (Std. err. adjusted for 53 clusters in Firm_ID)
------------------------------------------------------------------------------
                             |               Robust
  Return_on_Common_Equity    | Coefficient  std. err.      t    P>|t|     [95% conf. interval]
-----------------------------+------------------------------------------------
       Lagged_ESG_std_new    |  -.0020158   .0159402    -0.13   0.900    -.0340022    .0299705
Regulatory_Dummy_Mandatory   |  -.0189643   .0426647    -0.44   0.659    -.1045773    .0666486
 ESG_Mandatory_Interaction   |    .029746   .0283902     1.05   0.300    -.0272231    .0867151
      log_Total_Assets_std   |  -.2297114   .1260765    -1.82   0.074    -.4827024    .0232795
           Debt_to_Equity    |  -.0098202   .0098777    -0.99   0.325    -.0296413    .0100009
                             |
                        Year |
                        2014 |  -.0022907   .0166591    -0.14   0.891    -.0357195    .0311382
                        2015 |  -.1228365   .0611486    -2.01   0.050    -.2455401   -.000133
                        2016 |    .006723   .030544     0.22   0.827    -.054568     .068014
                        2017 |   .0236087   .0215078     1.10   0.277    -.01955      .0667673
                        2018 |  -.0050361   .0259357    -0.19   0.847    -.0570799    .0470077
                        2019 |  -.0205157   .0305863    -0.67   0.505    -.0818916    .0408602
                        2020 |   -.045047   .0334789    -1.35   0.184    -.1122273    .0221333
                        2021 |   .0316514   .0402825     0.79   0.436    -.0491813    .1124842
                        2022 |   .0470095   .0409279     1.15   0.256    -.0351184    .1291374
                        2023 |   .0723661   .0689958     1.05   0.299    -.0660841    .2108164
                             |
                       _cons |   .1564147   .0221941     7.05   0.000     .1118789    .2009504
-----------------------------+------------------------------------------------
                     sigma_u |  .25260979
```

Interaction Model (ESG × Mandatory Regulation) for Tobin's Q



```
Group variable: Firm_ID                         Number of groups  =        53

R-squared:                                      Obs per group:
     Within  = 0.1136                                         min =         8
     Between = 0.2863                                         avg =      10.9
     Overall = 0.2663                                         max =        11

                                                F(15, 52)         =      4.32
corr(u_i, Xb) = 0.2864                          Prob > F          =    0.0000

                                              (Std. err. adjusted for 53 clusters in Firm_ID)
------------------------------------------------------------------------------
                             |               Robust
        log_Tobin_Q          | Coefficient  std. err.      t    P>|t|     [95% conf. interval]
-----------------------------+------------------------------------------------
       Lagged_ESG_std_new    |  -.0225204    .025015    -0.90   0.372    -.0727167    .0276759
Regulatory_Dummy_Mandatory   |  -.1332407   .0524019    -2.54   0.014    -.2383928   -.0280886
 ESG_Mandatory_Interaction   |   .0143223   .0227993     0.63   0.533    -.0314278    .0600724
      log_Total_Assets_std   |  -.1861753   .0466442    -3.99   0.000    -.2797737   -.092577
           Debt_to_Equity    |  -.0021929   .0150655    -0.15   0.885     -.032424    .0280382
                             |
                        Year |
                        2014 |  -.0477391   .0259454    -1.84   0.071    -.0998023    .0043241
                        2015 |  -.0051575   .0415205    -0.12   0.902    -.0884745    .0781595
                        2016 |  -.0632018   .0446682    -1.41   0.163     -.152835    .0264314
                        2017 |  -.0099969   .0552284    -0.18   0.857    -.1208208     .100827
                        2018 |  -.0033744   .0573942    -0.06   0.953    -.1185442    .1117954
                        2019 |   .0258713   .0591349     0.44   0.664    -.0927916    .1445341
                        2020 |  -.0886152    .05928    -1.49   0.141    -.2075692    .0303387
                        2021 |   .0556669   .0640848     0.87   0.389    -.0729287    .1842625
                        2022 |   .0286663   .0689227     0.42   0.679    -.1096372    .1669699
                        2023 |   .0662921   .0836739     0.79   0.432    -.1016119     .234196
                             |
                       _cons |   .5248324   .0448858    11.69   0.000     .4347624    .6149024
-----------------------------+------------------------------------------------
                     sigma_u |  .66839479
```

Section D: ANOVA Tests

```
anova Return_on_Assets Regulatory_Dummy_Voluntary

                   Number of obs =       574    R-squared     =  0.0034
                   Root MSE      =  .103618    Adj R-squared =  0.0017

          Source | Partial SS         df         MS        F     Prob>F
-----------------+------------------------------------------------------
           Model |  .02094205          1   .02094205      1.95  0.1631
                 |
      Regulat~ary |  .02094205          1   .02094205      1.95  0.1631
                 |
        Residual |  6.1414424        572   .01073679
-----------------+------------------------------------------------------
           Total |  6.1623844        573    .0107546
```

```
anova Return_on_Common_Equity Regulatory_Dummy_Voluntary

                   Number of obs =       571    R-squared     =  0.0040
                   Root MSE      =  .260507    Adj R-squared =  0.0022

          Source | Partial SS         df         MS        F     Prob>F
-----------------+------------------------------------------------------
           Model |  .15476376          1   .15476376      2.28  0.1316
                 |
      Regulat~ary |  .15476376          1   .15476376      2.28  0.1316
                 |
        Residual |  38.614632        569   .06786403
-----------------+------------------------------------------------------
           Total |  38.769396        570   .06801648
```

```
anova log_Tobin_Q Regulatory_Dummy_Voluntary

                   Number of obs =       583    R-squared     =  0.0042
                   Root MSE      =  .754404    Adj R-squared =  0.0025

          Source | Partial SS         df         MS        F     Prob>F
-----------------+------------------------------------------------------
           Model |  1.4004992          1   1.4004992      2.46  0.1173
                 |
      Regulat~ary |  1.4004992          1   1.4004992      2.46  0.1173
                 |
        Residual |  330.66146        581   .56912471
-----------------+------------------------------------------------------
           Total |  332.06196        582   .57055319
```

```
anova Return_on_Assets Regulatory_Dummy_Mandatory

                      Number of obs =       574    R-squared     =  0.0006
                      Root MSE      =  .103763    Adj R-squared = -0.0011

              Source | Partial SS         df         MS        F    Prob>F
-------------------------------------------------------------------------
               Model |  .00378815          1   .00378815     0.35  0.5533
          Regulat~ory |  .00378815          1   .00378815     0.35  0.5533
            Residual |  6.1585963        572   .01076678
-------------------------------------------------------------------------
               Total |  6.1623844        573    .0107546
```

```
anova Return_on_Common_Equity Regulatory_Dummy_Mandatory

                      Number of obs =       571    R-squared     =  0.0001
                      Root MSE      =  .261017    Adj R-squared = -0.0017

              Source | Partial SS         df         MS        F    Prob>F
-------------------------------------------------------------------------
               Model |  .00338281          1   .00338281     0.05  0.8237
          Regulat~ory |  .00338281          1   .00338281     0.05  0.8237
            Residual |  38.766013        569   .06813008
-------------------------------------------------------------------------
               Total |  38.769396        570   .06801648
```

```
anova log_Tobin_Q Regulatory_Dummy_Mandatory

                      Number of obs =       583    R-squared     =  0.0210
                      Root MSE      =  .748026    Adj R-squared =  0.0193

              Source | Partial SS         df         MS        F    Prob>F
-------------------------------------------------------------------------
               Model |  6.9677234          1  6.9677234    12.45  0.0005
          Regulat~ory |  6.9677234          1  6.9677234    12.45  0.0005
            Residual |  325.09423        581  .55954257
-------------------------------------------------------------------------
               Total |  332.06196        582  .57055319
```

Appendix 3: Research Question 3:

ROA:

```
Random-effects GLS regression                   Number of obs     =        573
Group variable: Firm_ID                         Number of groups  =         53

R-squared:                                      Obs per group:
     Within  = 0.0500                                         min =          7
     Between = 0.2529                                         avg =       10.8
     Overall = 0.1486                                         max =         11

                                                Wald chi2(16)     =     120.26
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000

                                  (Std. err. adjusted for 53 clusters in Firm_ID)
------------------------------------------------------------------------------
             |               Robust
Return_on_Assets | Coefficient  std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
  Lagged_ESG_std_new |  -.0164069   .0123167    -1.33   0.183    -.0405472    .0077335
         ESG_Energy |   .0280976   .0128253     2.19   0.028     .0029605    .0532347
      ESG_Financials |   .0192978   .0102032     1.89   0.059       -.0007    .0392957
log_Total_Assets_std |  -.0232043   .0101301    -2.29   0.022    -.0430588   -.0033497
      Debt_to_Equity |  -.0036217   .0027925    -1.30   0.195    -.0090948    .0018515
       Country_dummy |  -.0462986   .0196042    -2.36   0.018    -.0847222   -.0078751

                Year |
                2014 |  -.0006174    .006443    -0.10   0.924    -.0132455    .0120106
                2015 |  -.0424364   .0216547    -1.96   0.050    -.0848787    5.98e-06
                2016 |   -.007294   .0128163    -0.57   0.569    -.0324135    .0178255
                2017 |   .0082636   .0105531     0.78   0.434      -.01242    .0289473
                2018 |   -.008222   .0119443    -0.69   0.491    -.0316324    .0151884
                2019 |  -.0001165   .0129804    -0.01   0.993    -.0255577    .0253246
                2020 |  -.0186942   .0136014    -1.37   0.169    -.0453525    .0079641
                2021 |   .0038761    .016707     0.23   0.817     -.028869    .0366213
                2022 |   .0074883   .0095424     0.78   0.433    -.0112144     .026191
                2023 |   .0029473   .0126753     0.23   0.816    -.0218959    .0277905

               _cons |   .0846609   .0201702     4.20   0.000     .045128    .1241938
------------------------------------------------------------------------------
```

ROE:

```
Random-effects GLS regression                   Number of obs     =        571
Group variable: Firm_ID                         Number of groups  =         53

R-squared:                                      Obs per group:
     Within  = 0.0561                                         min =          7
     Between = 0.1979                                         avg =       10.8
     Overall = 0.1090                                         max =         11

                                                Wald chi2(16)     =      85.84
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000

                                  (Std. err. adjusted for 53 clusters in Firm_ID)
------------------------------------------------------------------------------
             |               Robust
Return_on_Common_E~y | Coefficient  std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
  Lagged_ESG_std_new |  -.0172261   .0408109    -0.42   0.673     -.097214    .0627619
         ESG_Energy |   .0659589   .0460071     1.43   0.152    -.0242134    .1561313
      ESG_Financials |   .0337939   .0395814     0.85   0.393    -.0437842     .111372
log_Total_Assets_std |  -.0379187   .0259183    -1.46   0.143    -.0887176    .0128802
      Debt_to_Equity |   -.007776   .0111668    -0.70   0.486    -.0296625    .0141105
       Country_dummy |  -.1221115   .0401004    -3.05   0.002    -.2007067   -.0435162

                Year |
                2014 |  -.0002489   .0180446    -0.01   0.989    -.0356158    .0351179
                2015 |  -.1247633   .0580476    -2.15   0.032    -.2385345    -.010992
                2016 |  -.0058408   .0303333    -0.19   0.847    -.0652931    .0536115
                2017 |  -.0065956   .0262902    -0.25   0.802    -.0581235    .0449322
                2018 |  -.0389484   .0261777    -1.49   0.137    -.0902558    .0123591
                2019 |  -.0617301   .0329346    -1.87   0.061    -.1262808    .0028206
                2020 |  -.0874186   .0293407    -2.98   0.003    -.1449252   -.0299119
                2021 |  -.0153355   .0356919    -0.43   0.667    -.0852903    .0546192
                2022 |  -.0080415    .031922    -0.25   0.801    -.0706074    .0545244
                2023 |   .0073281   .0396291     0.18   0.853    -.0703435    .0849997

               _cons |    .245138   .0476501     5.14   0.000     .1517455    .3385306
-------------+----------------------------------------------------------------
             sigma_u |  .13154753
```

Tobin’s Q:

```
Random-effects GLS regression                   Number of obs     =       577
Group variable: Firm_ID                         Number of groups  =        53

R-squared:                                      Obs per group:
     Within  = 0.1140                                         min =         8
     Between = 0.3490                                         avg =      10.9
     Overall = 0.3302                                         max =        11

                                                Wald chi2(16)     =     73.96
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =    0.0000

                                  (Std. err. adjusted for 53 clusters in Firm_ID)
------------------------------------------------------------------------------
             |               Robust
  log_Tobin_Q |      Coef.   Std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
Lagged_ESG_std_new |  -.0999901   .0481318    -2.08   0.038    -.1943267   -.0056535
        ESG_Energy |   .0859651   .0496339     1.73   0.083    -.0113156    .1832458
     ESG_Financials |   .1240479   .0482689     2.57   0.010     .0294425    .2186532
log_Total_Assets_std |  -.1988334   .0471817    -4.21   0.000    -.2913077    -.106359
     Debt_to_Equity |  -.0018057   .0155771    -0.12   0.908    -.0323363     .028725
      Country_dummy |  -.5051593   .1745286    -2.89   0.004    -.8472291   -.1630894
                    |
               Year |
               2014 |  -.0499395   .0272224    -1.83   0.067    -.1032944    .0034155
               2015 |  -.0047776    .041547    -0.11   0.908    -.0862083    .0766531
               2016 |  -.0569509   .0457599    -1.24   0.213    -.1466386    .0327367
               2017 |  -.0073394   .0567732    -0.13   0.897    -.1186128     .103934
               2018 |   .0002227   .0574855     0.00   0.997    -.1124467    .1128922
               2019 |   .0314464   .0594613     0.53   0.597    -.0850956    .1479885
               2020 |   -.079994   .0597238    -1.34   0.180    -.1970505    .0370625
               2021 |    .000259   .0561673     0.00   0.996    -.1098269     .110345
               2022 |  -.0259613    .06159    -0.42   0.673    -.1466756    .0947529
               2023 |    -.04516   .0624731    -0.72   0.470    -.1676051    .0772851
                    |
              _cons |   .7965412   .1609459     4.95   0.000     .481093    1.111989
------------------------------------------------------------------------------
```

Section B: ANOVA

```
. oneway Return_on_Assets Sector

                        Analysis of variance
    Source              SS         df      MS            F     Prob > F
------------------------------------------------------------------------
Between groups      1.39177322      2   .695886612     83.29     0.0000
 Within groups      4.77061118    571   .008354836
------------------------------------------------------------------------
    Total           6.16238441    573   .010754598

Bartlett's equal-variances test: chi2(2) = 654.9824    Prob>chi2 = 0.000

. oneway Return_on_Common_Equity Sector

                        Analysis of variance
    Source              SS         df      MS            F     Prob > F
------------------------------------------------------------------------
Between groups      4.30457739      2    2.1522887     35.47     0.0000
 Within groups      34.4648188    568   .060677498
------------------------------------------------------------------------
    Total           38.7693962    570   .068016485

Bartlett's equal-variances test: chi2(2) = 177.4352    Prob>chi2 = 0.000

. oneway log_Tobin_Q Sector

                        Analysis of variance
    Source              SS         df      MS            F     Prob > F
------------------------------------------------------------------------
Between groups      151.875908      2   75.9379542    244.44     0.0000
 Within groups      180.186048    580     .3106656
------------------------------------------------------------------------
    Total           332.061956    582    .57055319

Bartlett's equal-variances test: chi2(2) = 365.2512    Prob>chi2 = 0.000
```

Appendix 4: Research Question 4:

ROA:

```
Random-effects GLS regression                   Number of obs     =        501
Group variable: Firm_ID                         Number of groups  =         53

R-squared:                                      Obs per group:
     Within  = 0.0406                                         min =          5
     Between = 0.2931                                         avg =        9.5
     Overall = 0.1691                                         max =         10

                                                Wald chi2(14)     =      94.41
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000

                                 (Std. err. adjusted for 53 clusters in Firm_ID)
------------------------------------------------------------------------------
             |               Robust
Return_on_A~s | Coefficient  std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
       Env_std |   .0126929   .005919     2.14   0.032     .0010918    .024294
       Soc_std |  -.0106927   .0102885   -1.04   0.299    -.0308578   .0094725
log_Total_A~d |  -.0215552   .0138777   -1.55   0.120     -.048755   .0056446
Debt_to_Equity |  -.0048773   .0046376   -1.05   0.293    -.0139668   .0042121
Country_dummy |  -.0449473   .0195481   -2.30   0.021    -.0832609  -.0066338
              |
          Year |
         2015 |  -.0467424   .0257807   -1.81   0.070    -.0972717   .0037869
         2016 |  -.0090837   .0115846   -0.78   0.433    -.0317892   .0136217
         2017 |   .0108571   .0106878    1.02   0.310    -.0100907   .0318049
         2018 |  -.0066797   .0106494   -0.63   0.531    -.0275522   .0141927
         2019 |   .0008898   .0143952    0.06   0.951    -.0273242   .0291038
         2020 |  -.0185708   .0132598   -1.40   0.161    -.0445594   .0074179
         2021 |   .0042869   .0198915    0.22   0.829    -.0346998   .0432737
         2022 |   .0072941   .0111919    0.65   0.515    -.0146416   .0292298
         2023 |   .0000906   .0142477    0.01   0.995    -.0278344   .0280157
              |
        _cons |   .0863292   .0210198    4.11   0.000     .0451311   .1275272
-------------+----------------------------------------------------------------
      sigma_u |  .05900882
      sigma_e |  .07863702
------------------------------------------------------------------------------
```

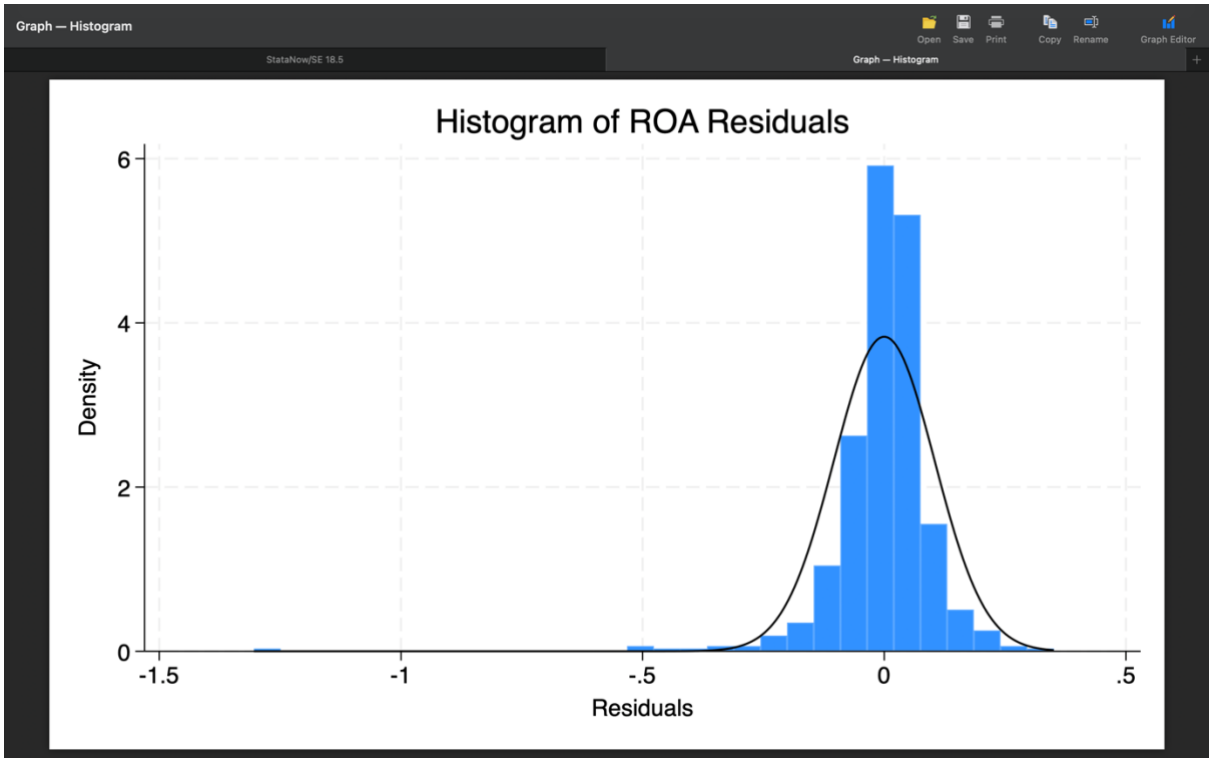
ROE:

```
Random-effects GLS regression                   Number of obs     =        500
Group variable: Firm_ID                         Number of groups  =         53

R-squared:                                      Obs per group:
     Within  = 0.0524                                         min =          5
     Between = 0.2176                                         avg =        9.4
     Overall = 0.1136                                         max =         10

                                                Wald chi2(14)     =      75.05
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000

                                 (Std. err. adjusted for 53 clusters in Firm_ID)
------------------------------------------------------------------------------
             |               Robust
Return_on_C~y | Coefficient  std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
       Env_std |   .0555204   .0199083     2.79   0.005     .0165008     .09454
       Soc_std |  -.046939    .0304776   -1.54   0.124     -.106674    .0127959
log_Total_A~d |  -.0196023   .0329315   -0.60   0.552    -.0841469    .0449423
Debt_to_Equity |  -.0111042   .0198672   -0.56   0.576    -.0500431    .0278348
Country_dummy |   -.101043   .0412738   -2.45   0.014    -.1819381   -.0201478
              |
          Year |
         2015 |  -.1382277   .0655993   -2.11   0.035      -.2668   -.0096553
         2016 |  -.0171212   .0337288   -0.51   0.612    -.0832285    .048986
         2017 |   .0074885   .0250575    0.30   0.765    -.0416232    .0566003
         2018 |  -.0218309   .0239489   -0.91   0.362    -.0687698    .025108
         2019 |  -.0478019   .0297687   -1.61   0.108    -.1061474    .0105437
         2020 |  -.0733205   .0306982   -2.39   0.017    -.1334878   -.0131532
         2021 |   .0019241   .0466694    0.04   0.967    -.0895463    .0933944
         2022 |   .0082055   .0292449    0.28   0.779    -.0491135    .0655245
         2023 |   .0176253    .054334    0.32   0.746    -.0888674    .1241181
              |
        _cons |   .2294241   .0509141    4.51   0.000     .1296343     .329214
-------------+----------------------------------------------------------------
      sigma_u |  .12425394
      sigma_e |  .21455535
------------------------------------------------------------------------------
```

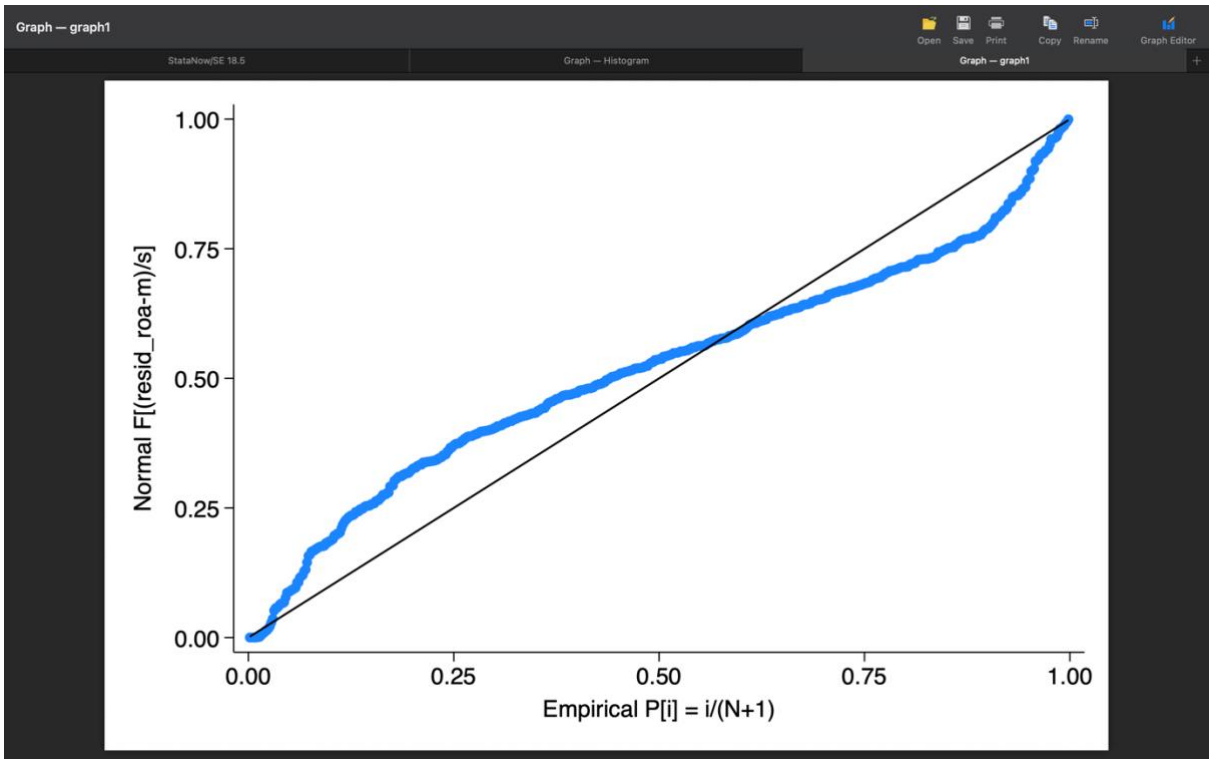
Tobins Q:

```
Random-effects GLS regression                   Number of obs     =        501
Group variable: Firm_ID                         Number of groups  =         53

R-squared:                                      Obs per group:
     Within  = 0.0909                                         min =          5
     Between = 0.3715                                         avg =        9.5
     Overall = 0.3603                                         max =         10

                                                Wald chi2(14)     =      69.56
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000

                                    (Std. err. adjusted for 53 clusters in Firm_ID)
------------------------------------------------------------------------------
             |               Robust
  log_Tobin_Q |      Coef.   Std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
       Env_std |  -.0039881   .0331224    -0.12   0.904    -.0689069    .0609306
       Soc_std |   -.016315   .0352105    -0.46   0.643    -.0853264    .0526964
log_Total_Assets_std |  -.3175329   .0831019    -3.82   0.000    -.4804097   -.1546562
  Debt_to_Equity |  -.0124234   .0078102    -1.59   0.112    -.0277312    .0028843
  Country_dummy |  -.4911381   .1711609    -2.87   0.004    -.8266072    -.155669
                |
            Year |
          2015  |   .0798995   .0325659     2.45   0.014     .0160714    .1437275
          2016  |   .0218711   .0351476     0.62   0.534    -.0470168    .0907591
          2017  |   .0788172    .048304     1.63   0.103    -.0158568    .1734913
          2018  |   .0880291   .0556901     1.58   0.114    -.0211216    .1971798
          2019  |   .1201116   .0597897     2.01   0.045     .0029259    .2372972
          2020  |   .0097287   .0652067     0.15   0.881     -.118074    .1375314
          2021  |   .0901296   .0622071     1.45   0.147    -.0317941    .2120533
          2022  |   .0686879   .0661849     1.04   0.299     -.061032    .1984078
          2023  |   .0439932   .0676207     0.65   0.515    -.0885409    .1765272
                |
          _cons  |   .7157537   .1528445     4.68   0.000     .4161839    1.015324
-------------+----------------------------------------------------------------
       sigma_u |  .57789762
       sigma_e |  .17547329
------------------------------------------------------------------------------
```

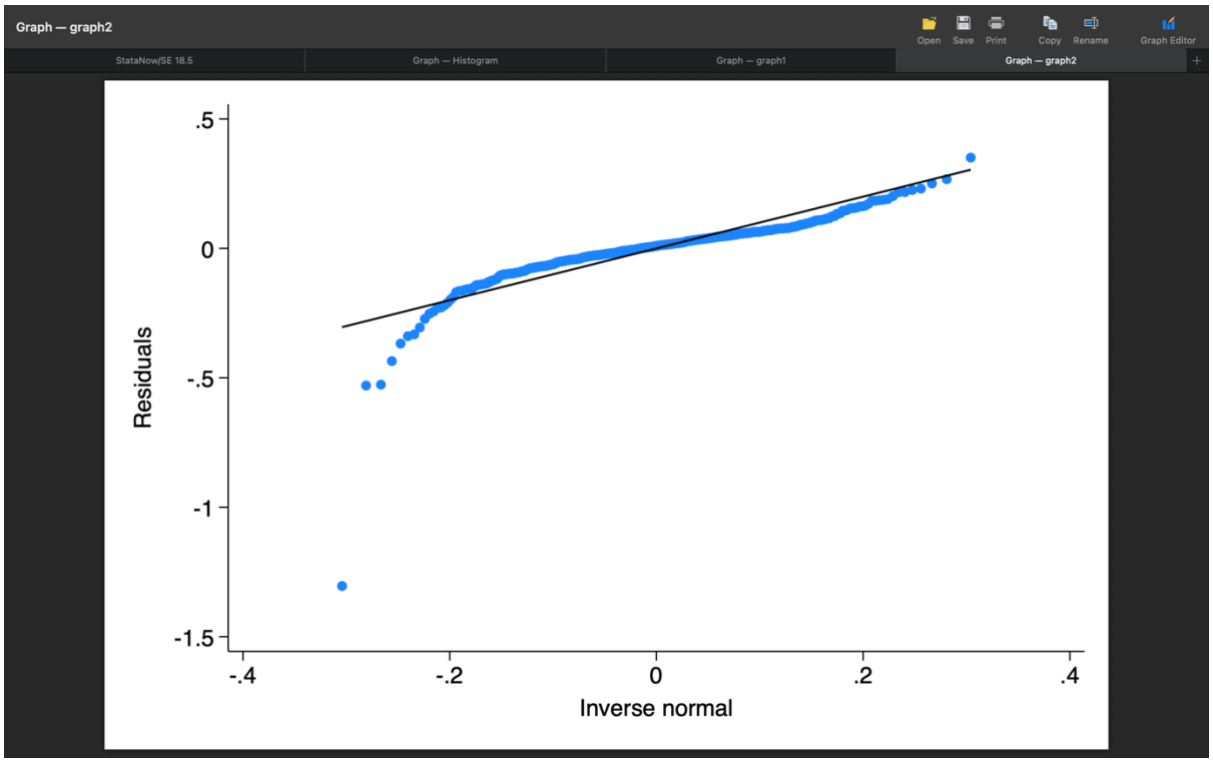
RQ1: ROA:

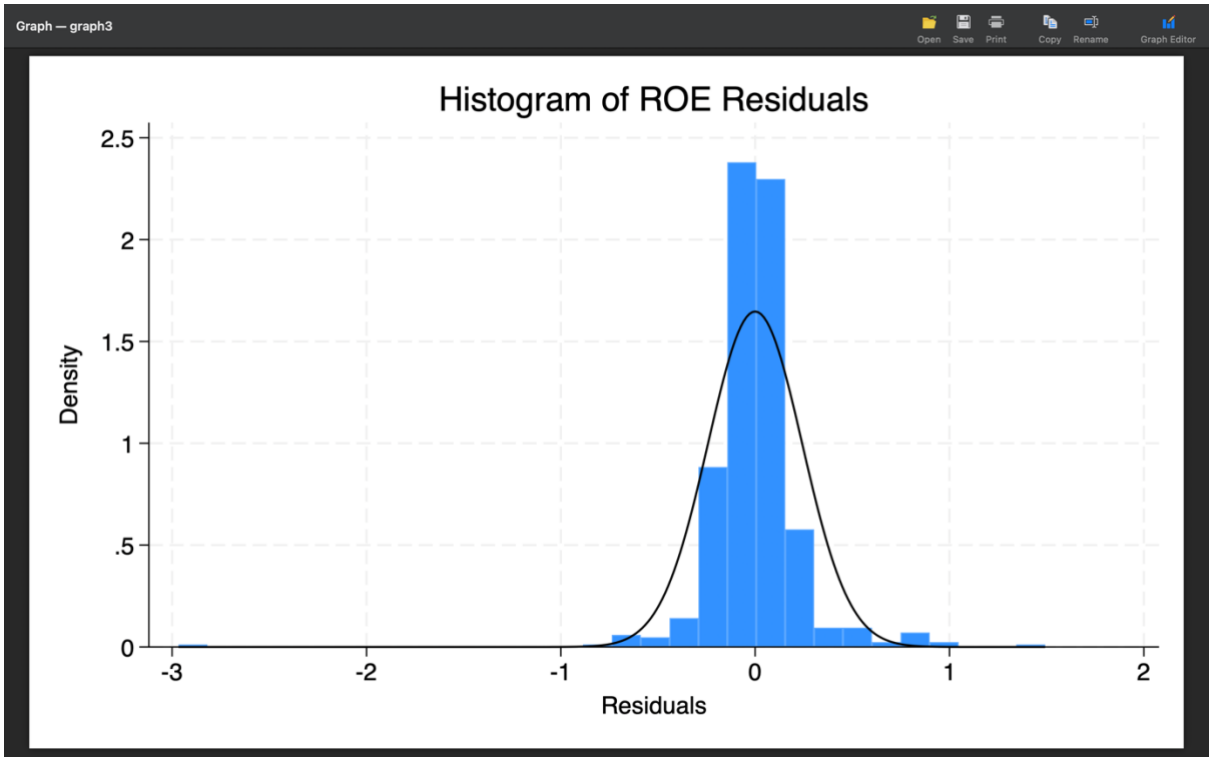


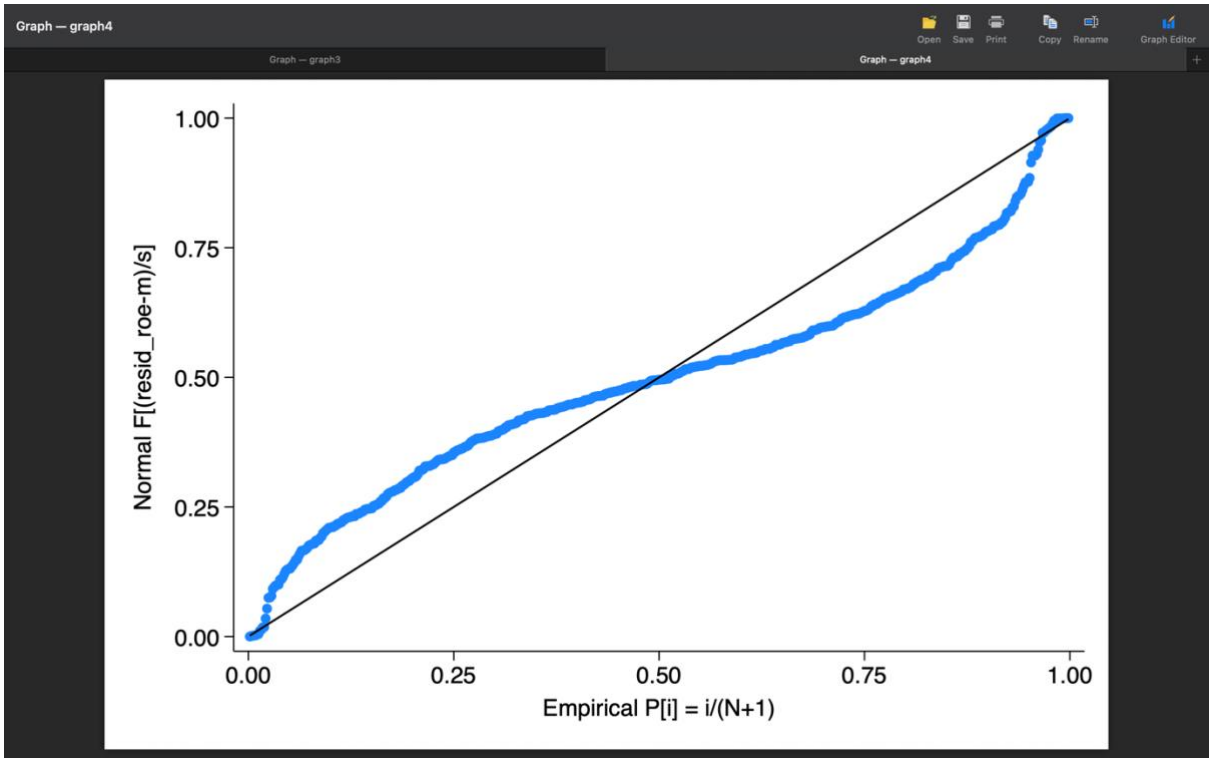
P-P Plot

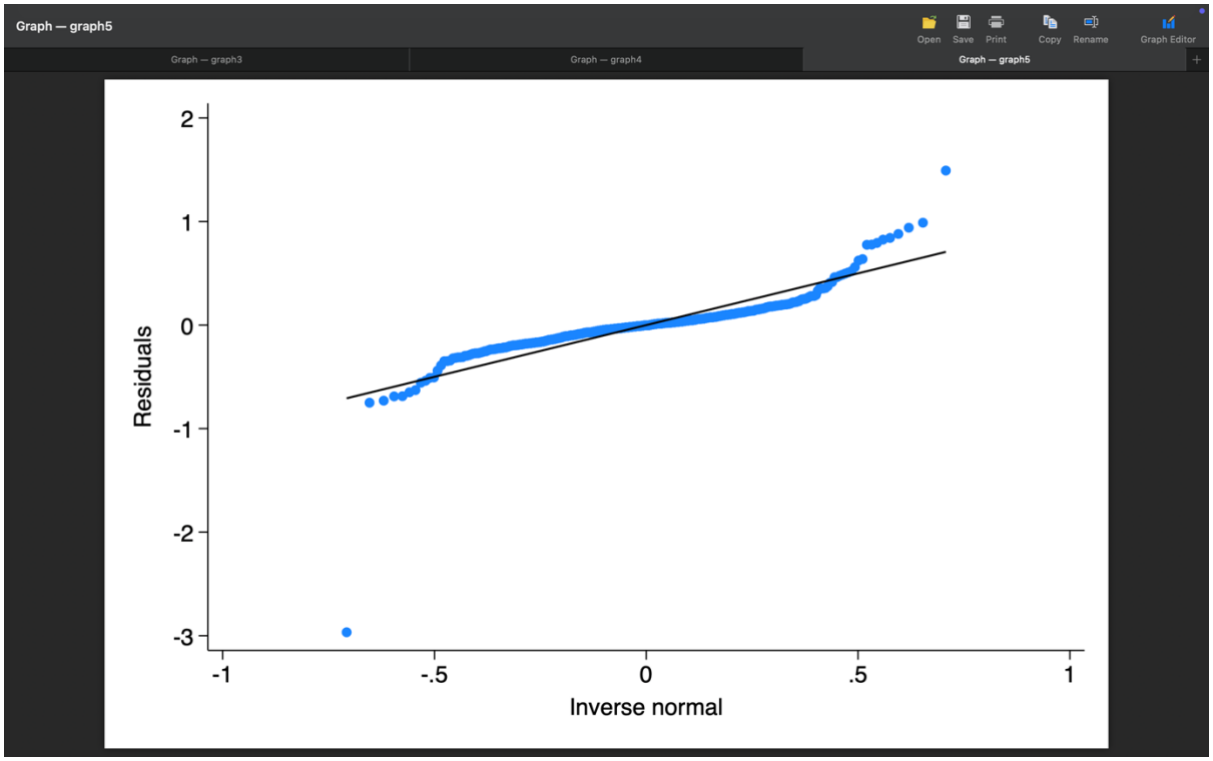


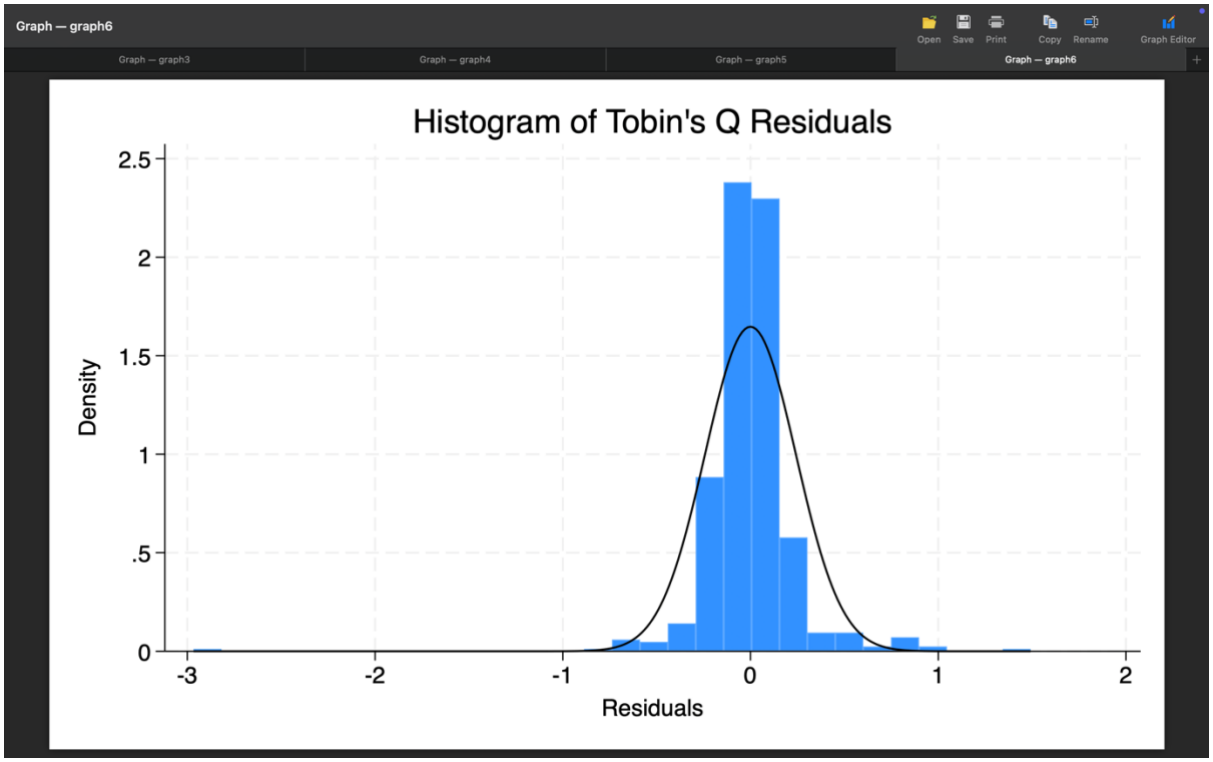
Q-Q Plot

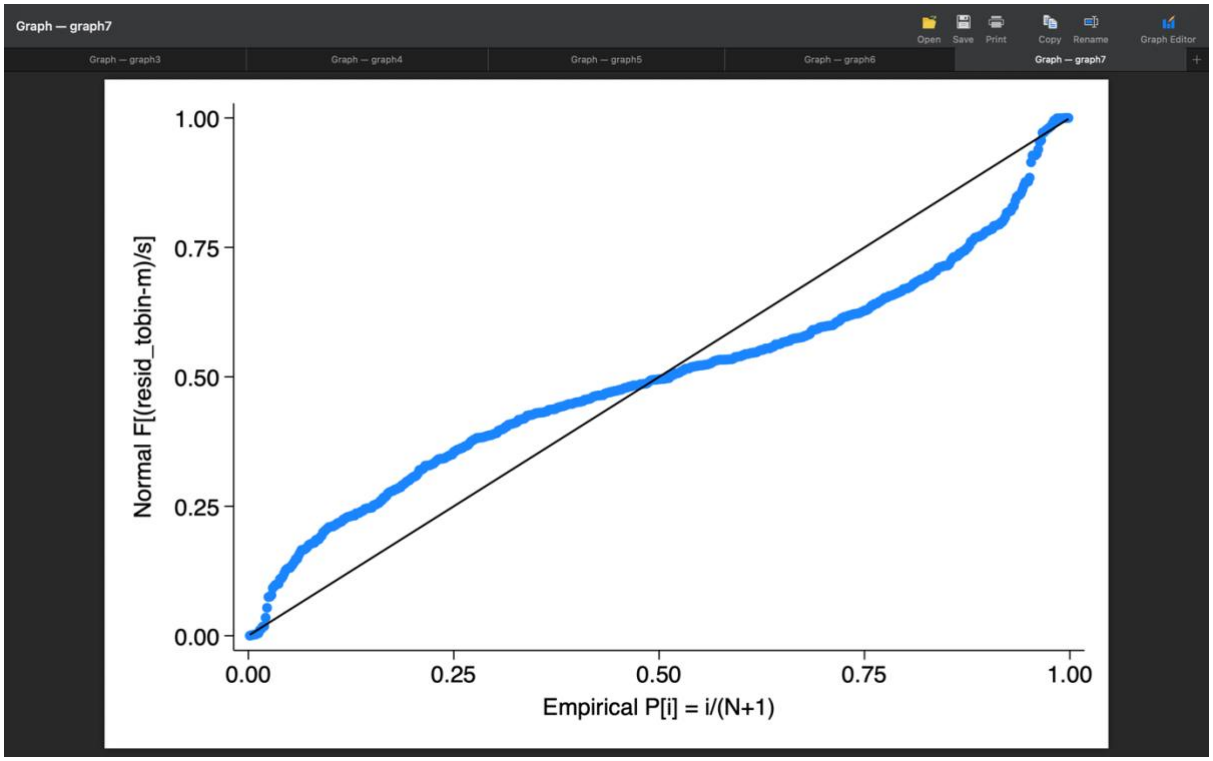


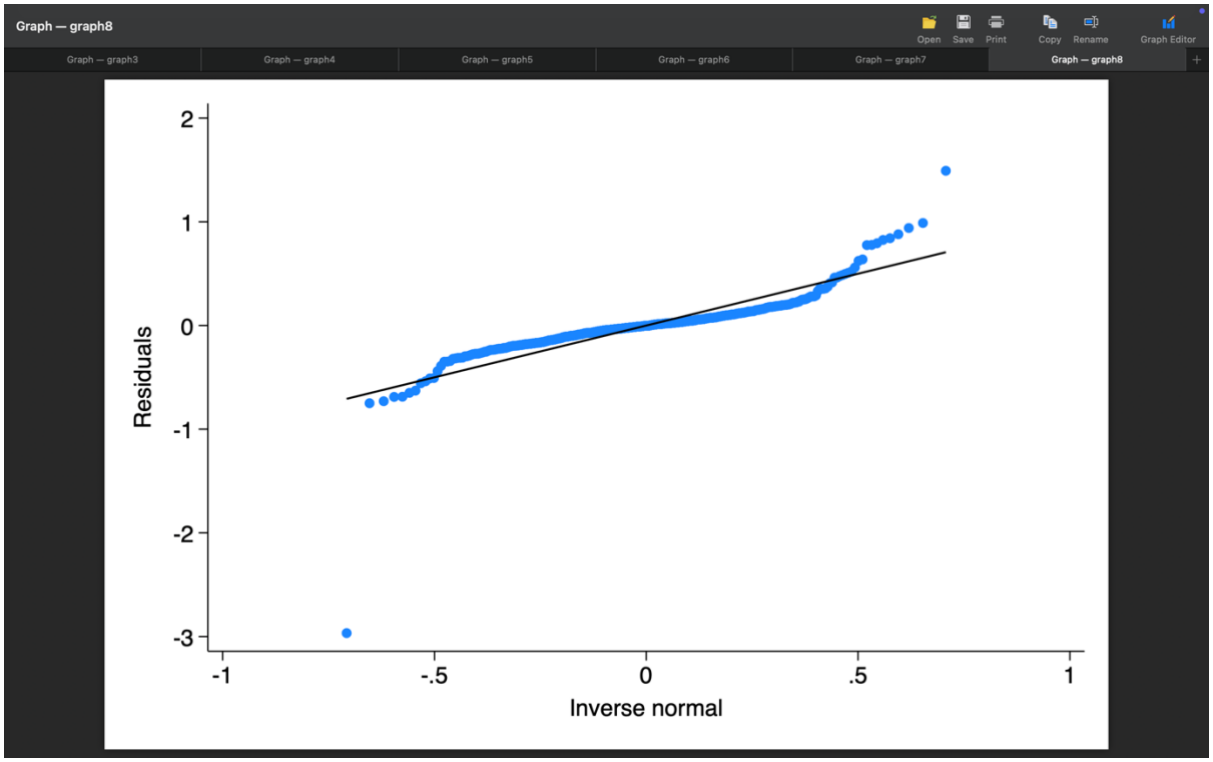

Graph — graph3
Open
Save
Print
Copy
Rename
Graph Editor
Histogram of ROE Residuals
Density
2.5
2
1.5
1
.5
0
-3
-2
-1
0
1
2
Residuals


Graph — graph4
Open
Save
Print
Copy
Rename
Graph Editor
Graph — graph3
Graph — graph4
Normal F[(resid_roe-m)/s]
1.00
0.75
0.50
0.25
0.00
0.00
0.25
0.50
0.75
1.00
Empirical P[i] = i/(N+1)

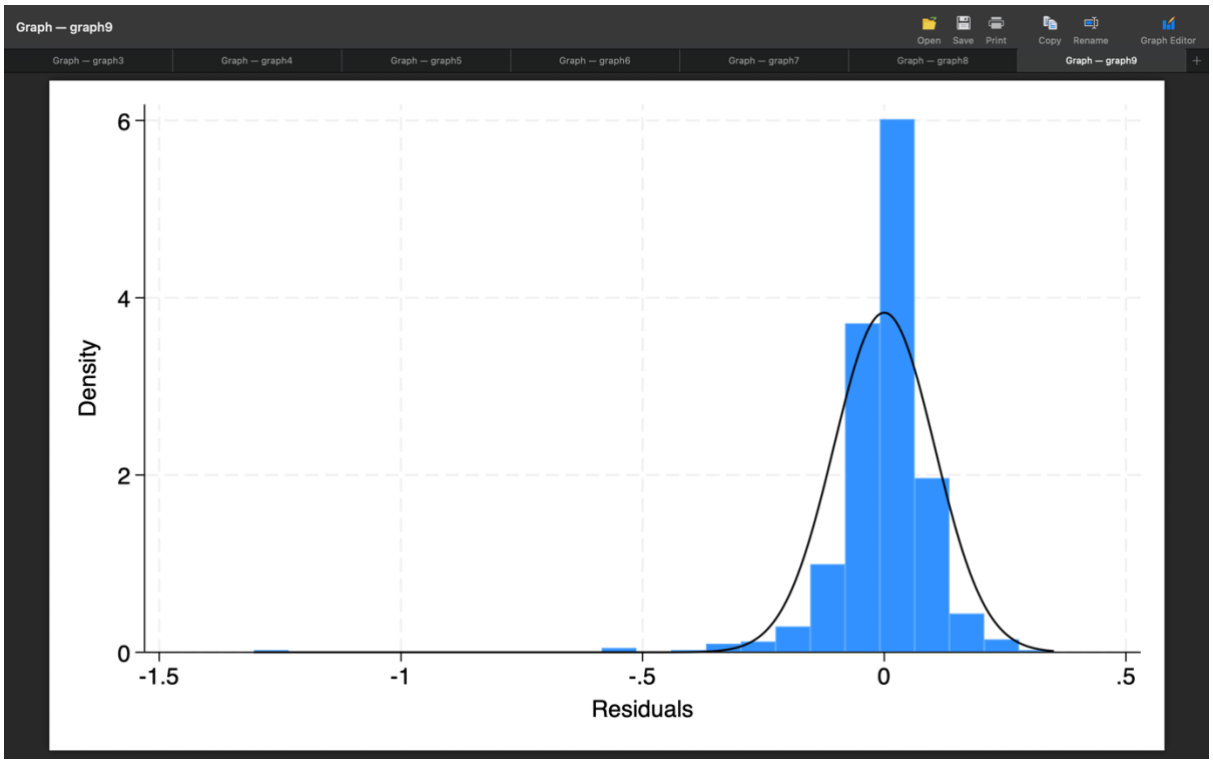

Graph — graph5
Open
Save
Print
Copy
Rename
Graph Editor
Graph — graph3
Graph — graph4
Graph — graph5
Residuals
2
1
0
-1
-2
-3
-1
-.5
0
.5
1
Inverse normal

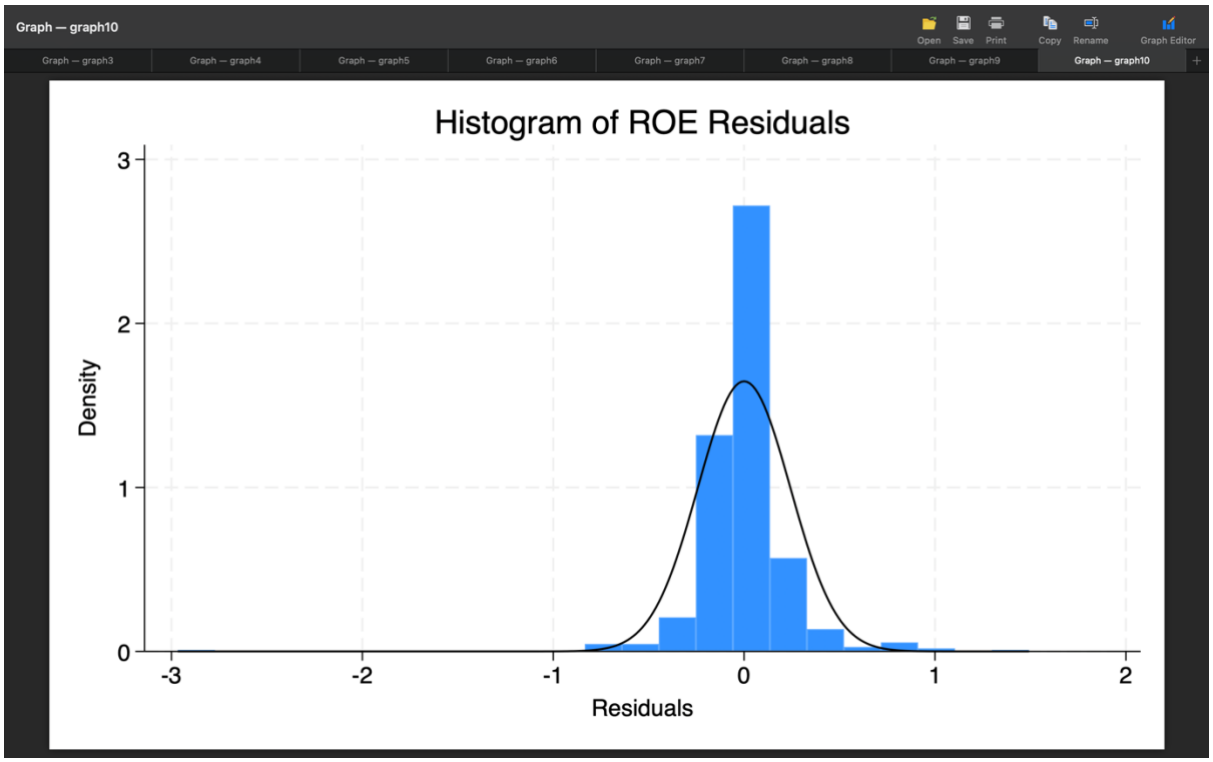

Graph — graph6
Open
Save
Print
Copy
Rename
Graph Editor
Graph — graph3
Graph — graph4
Graph — graph5
Graph — graph6
Histogram of Tobin's Q Residuals
Density
2.5
2
1.5
1
.5
0
-3
-2
-1
0
1
2
Residuals


Graph — graph7
Open
Save
Print
Copy
Rename
Graph Editor
Graph — graph3
Graph — graph4
Graph — graph5
Graph — graph6
Graph — graph7
1.00
0.75
0.50
0.25
0.00
Normal F[(resid_tobin-m)/s]
0.00
0.25
0.50
0.75
1.00
Empirical P[i] = i/(N+1)

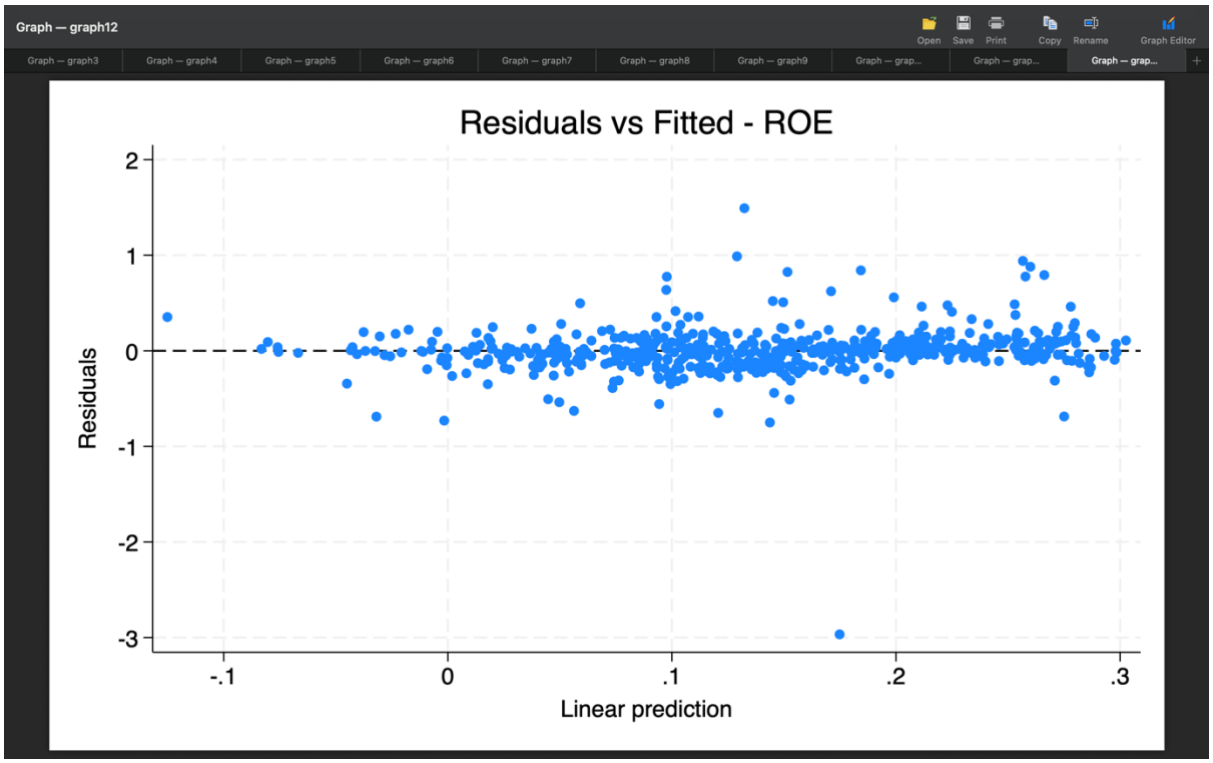

Graph — graph8
Open
Save
Print
Copy
Rename
Graph Editor
Graph — graph3
Graph — graph4
Graph — graph5
Graph — graph6
Graph — graph7
Graph — graph8
2
1
0
-1
-2
-3
Residuals
-1
-.5
0
.5
1
Inverse normal

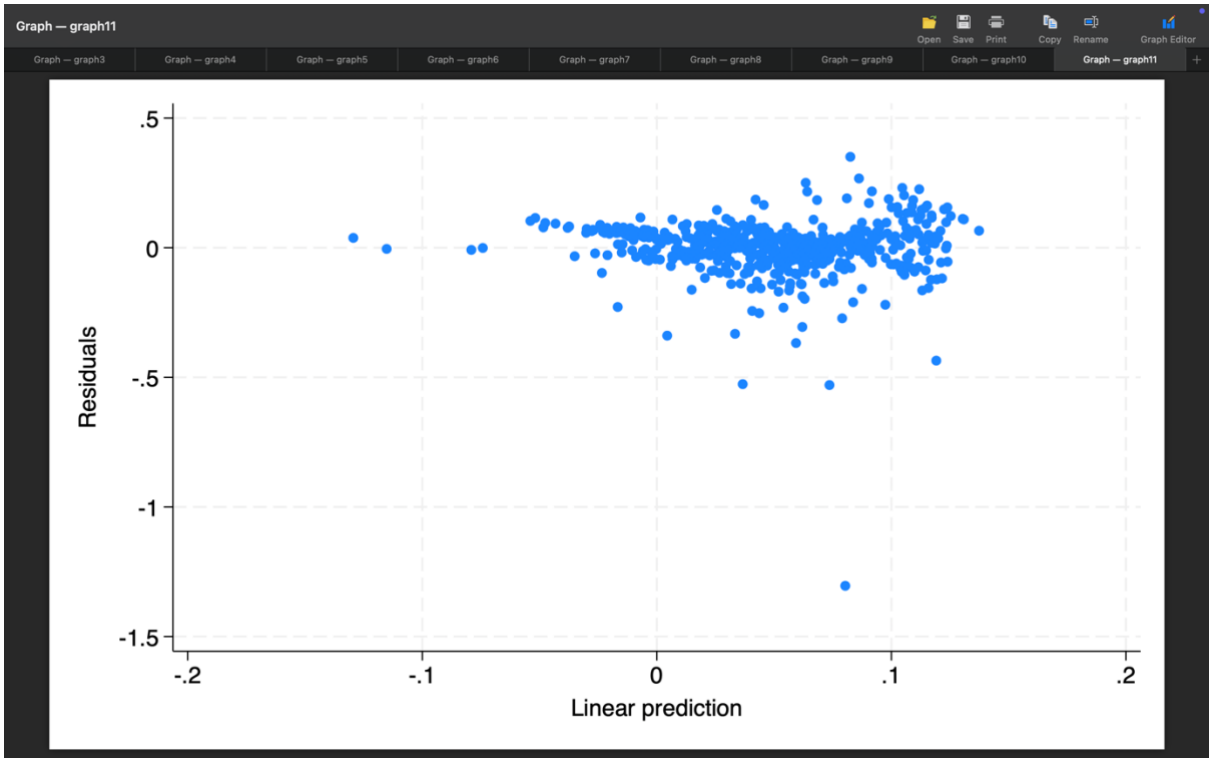
Research Question 2:

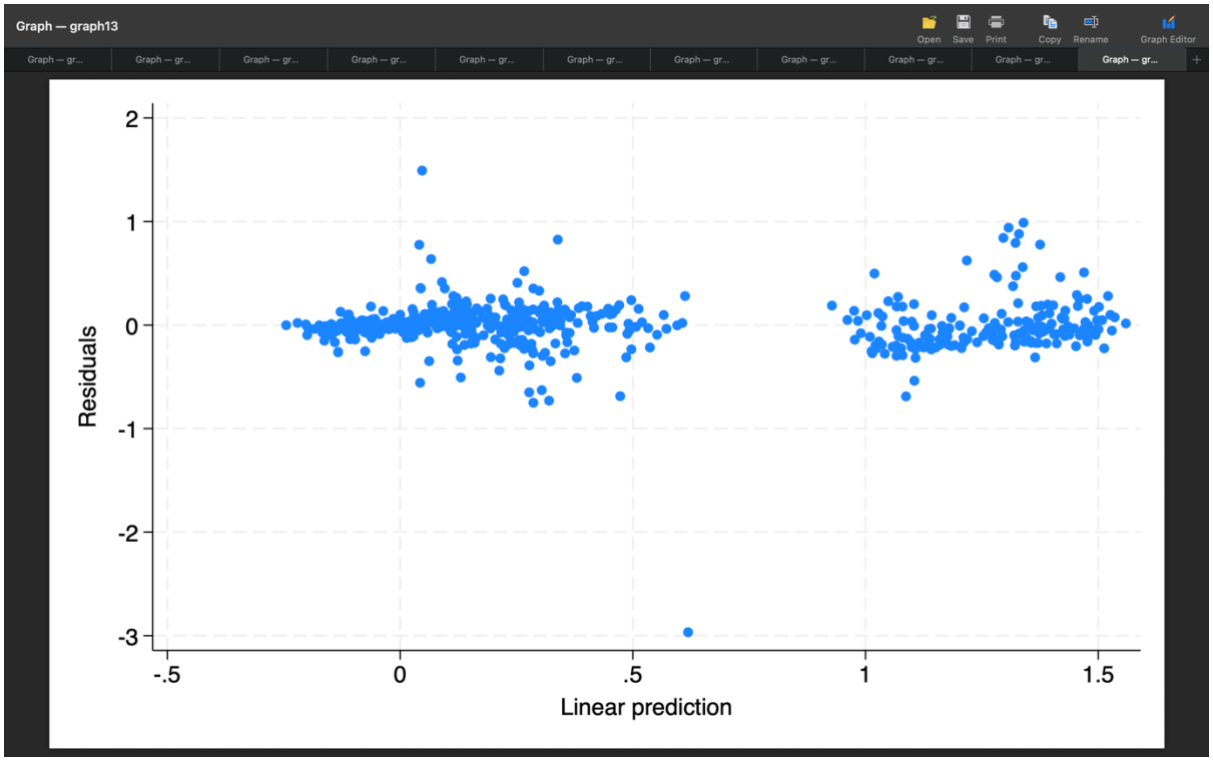




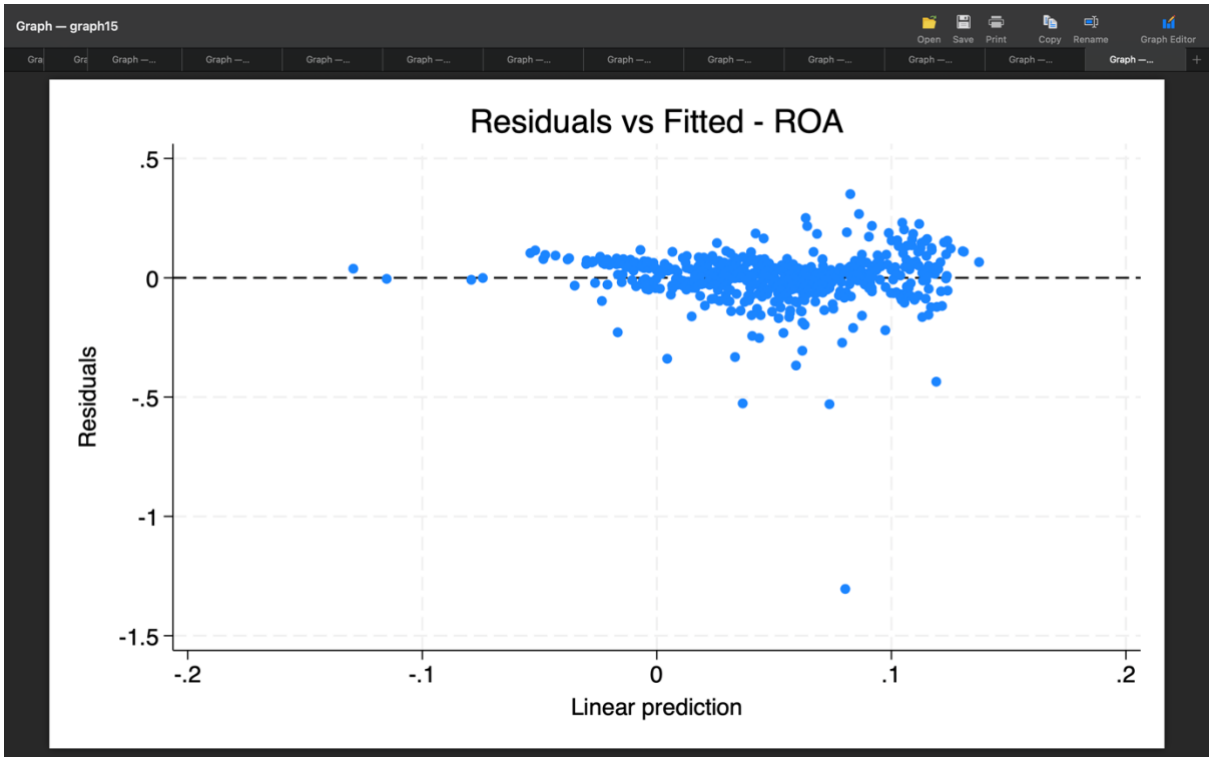
Residuals vs Fitted Plot



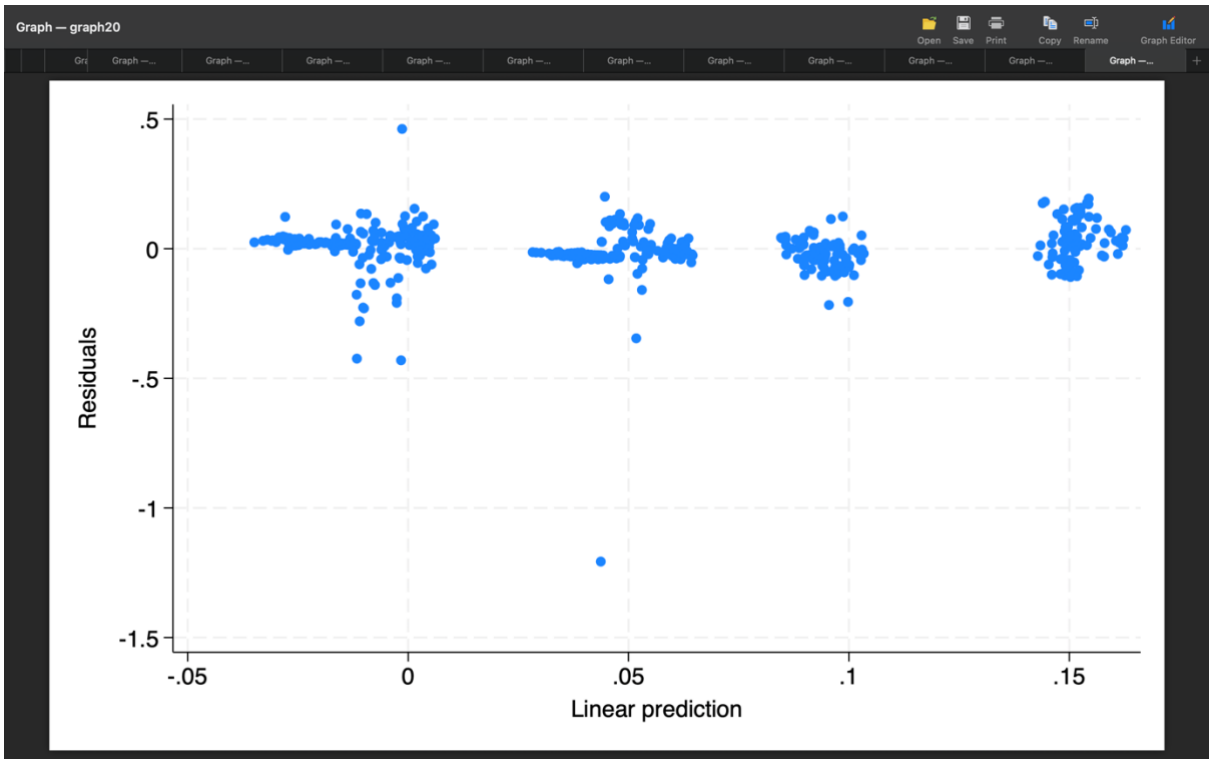


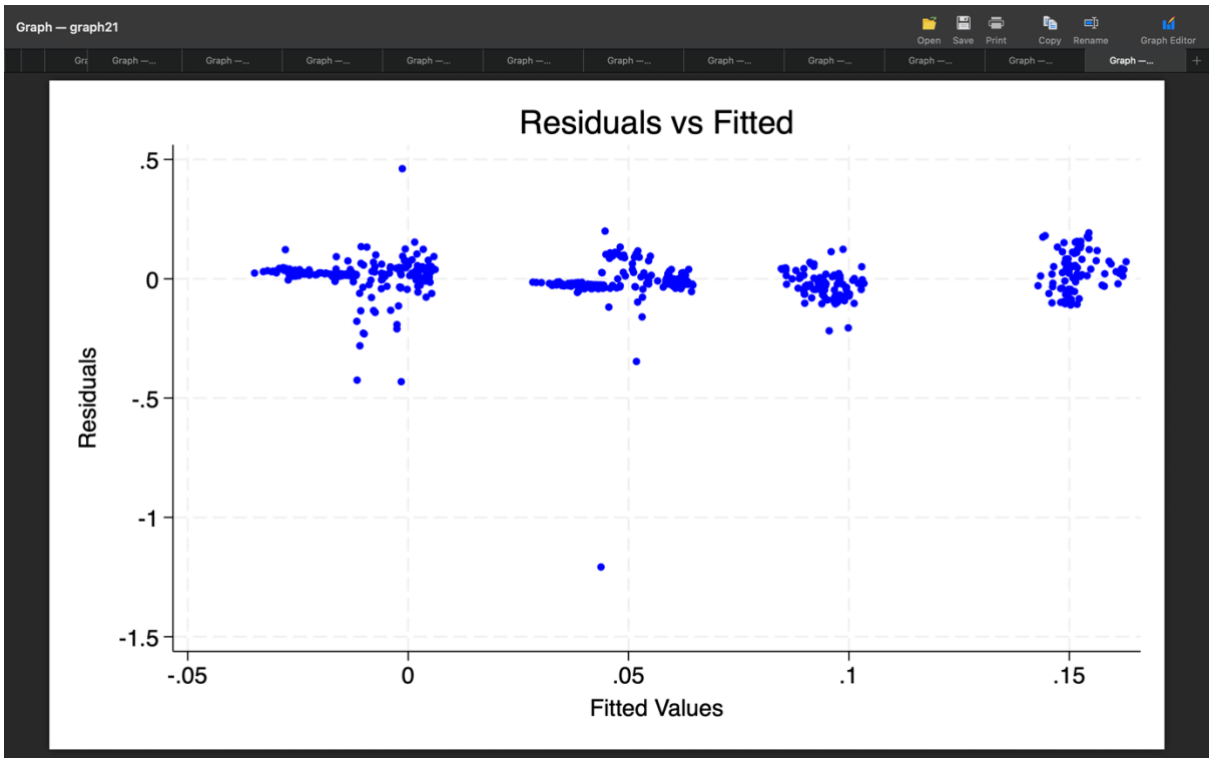


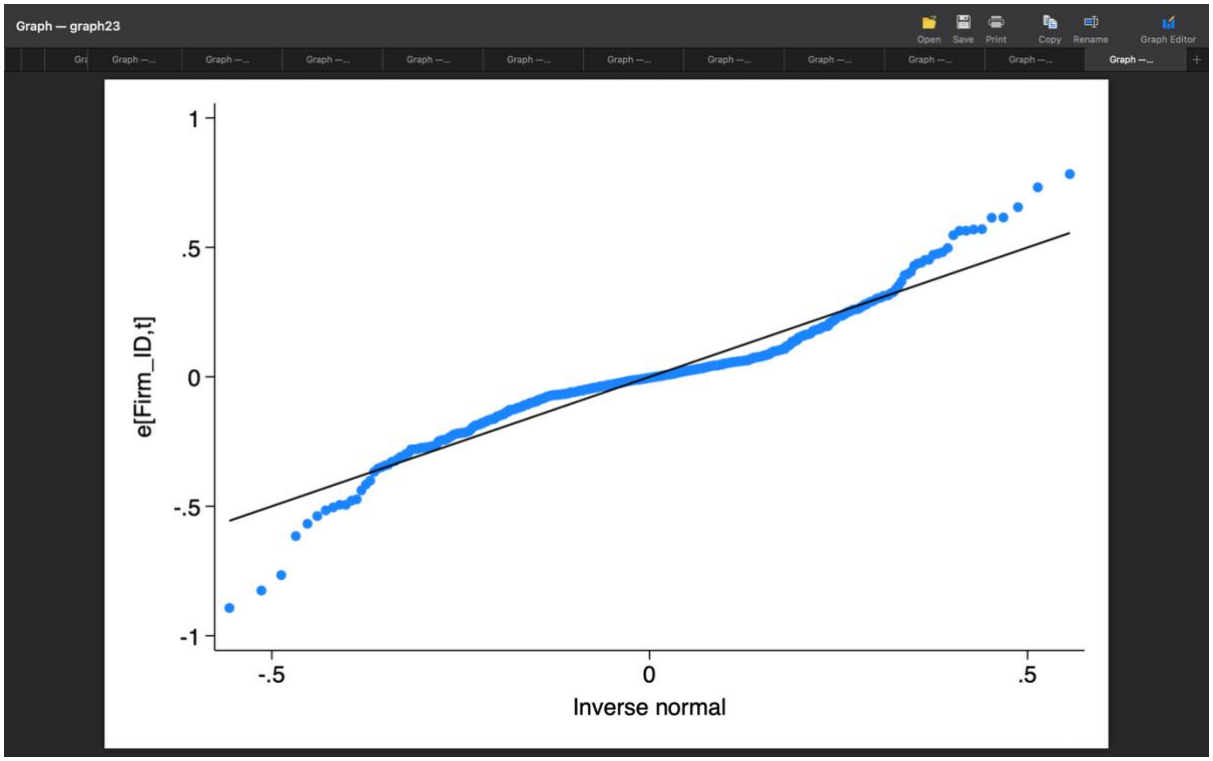
Residuals vs Fitted: Research Question 3



Research Question 4: ROA






Graph — graph23
Open
Save
Print
Copy
Rename
Graph Editor
1
.5
0
-.5
-1
e[Firm_ID,t]
-.5
0
.5
Inverse normal