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# The Mediating Role of ESG On the Interaction between Green Banking and Financial Performance of Commercial Banks in Kenya

By Lucy Maru\*

## Abstract

*Green banking practice involves the bank's internal operations, external operations and lending decisions which are environmentally, socially and governance (ESG) compliant and sustainable. In Kenya, green banking practice is influenced internally and externally and is context based. Adverse weather patterns such as drought and floods have recently influenced income in sectors such as agriculture, transport and manufacturing. The adverse effects have affected GDP and livelihoods and as a trickle down influenced savings and investments. From the year 2012, conversation on sustainable financial institution was tabled through a CEO round table targeting players in the banking sector. The aim was to transform the banking industry to be more resilient and sustainable. One way of greening the banking sector was by embracing green banking practices and incorporating ESG in banks' processes and products. This paper aims to investigate how green banking interacts with ESG performance to shape the financial outcomes of commercial banks in Kenya. The paper looks at profitability assessed through ROA and credit risk assessed through NPLs. Anchored on the stakeholder theory, the resource-based view theory and the institutional theory, the paper goes further to test the role of ESG as a mediator on the interaction between green banking and financial performance of commercial banks in Kenya. The paper uses panel data collected from commercial banks in Kenya. Secondary data on GBI, ESG and financial performance was collected for a period of 13 years. ESG and GBI measures were obtained, measured and scored using existing literature. The study analysed a total of 25 commercial banks applying balanced panel data regression with firm fixed effects and controls per year. Mediation analysis was used to test the indirect effect of green banking (independent variable) on financial performance (dependent variable) through the mediating variable (ESG). The findings of the study indicate that green banking positively influences financial performance.*

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*The findings also indicate that green banking reduces credit risk. As a mediator, ESG shows a statistically strong association with green banking. However, from the mediator, there is a limited mediating effect on performance and risk. The findings indicate that as commercial banks embrace ESG practices, they become greener and this has a positive and statistically significant relationship with financial performance. Therefore, this paper aims at proposing measures that policy makers and banks as heads of the supply chain can adopt in driving climate risk mitigation and adaptation, and incorporating ESG in banking practice, while safeguarding financial performance. The paper encourages commercial banks to embrace green banking and ESG practices in order to draw short term, medium term and long-term benefits that accrue.*

**Key words:** *Green Banking Practice, ESG (Environmental Social and Governance), Financial performance*

## 1.0 Introduction

**F**inancial institutions have a fundamental role in growth and development through mobilizing and circulating of finances (Varghese & Joseph, 2014). A stable financial system facilitates liquidity and funds factors of production. The banking industry is one of the oldest industries in the world (Goyal & Joshi, 2011) and can be traced back to 2000BC.

In Kenya, history of banking can be traced to the late 19th century when the first branch in Mombasa was established by the National Bank of India in 1896. In the banking sector lies unforeseeable risks due to unforeseeable challenges which are economic and environmental in nature, (Dikau & Volz, 2021). While some of the risks are endogenous and internally mitigated, other risks are exogenous and challenging. One of the exogenous risks currently facing the world is climate and nature related risk. Research conducted by (Misra, 2014), indicates that climate risk is a critical problem facing the world. Climate and nature related risks can affect financial stability through physical risk (submergence of cities and hinterlands, loss of livelihoods and damage to collaterals), liability risk (Lawsuits and litigation), and transition risk (adjusting to de-carbonation of the economy). (Capasso et al., 2020) note that companies with a high carbon foot print are perceived by market as more likely to default.

While financial performance is the central element for any profit-based organization, an organization may choose to get involved in green banking practices in order to have an impact on various other dimensions and stakeholders. An argument closely anchored on the institutional and stakeholder theory is that organizations are dependent on the external environments for several reasons. These dependencies cause power and politics. Due to these interdependencies, organizations must have ways in which they ensure that they do not lose their power. When organizations are aware of their interdependencies, they will be more resilient and, in a position to survive, remain competitive and make profits. On the contrary, an organization's failure to identify its interdependencies leads to loss of power, which may be seen in the strength of its profitability, its balance sheet, and its return on assets the eventual survival or exit from the market. Further, financial regulators and policy makers ought to carefully consider the effect of climate risks on stability of both financial intermediaries and corporate bond markets.



Environmental concerns regarding the influence of financial institutions on climate risk began way back in 1972 during the Stockholm conference during which the UNEP was established. In 1992 the Rio Summit was held in Geneva and the UNFCCC was established with the objective of stabilizing greenhouse gas emissions. Later, the first conference of parties was held in 1995 and there were established legally binding obligations to reduce greenhouse gases. In 1997, the Kyoto Protocol was extended from the 1992 UNFCCC with the aim of committing industrialized countries and economies in transition to limiting and reducing greenhouse gases. In the year 2002 the equator principles were set up which are a set of guidelines adopted by financial institutions to ensure that large projects and development adopt certain guidelines to mitigate for impact of projects on the environment and affected communities. Later in the year 2005, UN-PRI was established. The UN-PRI (Principles for Responsible Investment), was established to promote the incorporation of ESG (environmental social and governance) in decision making. Following the developments, climate funds have been established with the purpose of financing green projects. Institutionalization of global concepts of sustainable development may be distinguished by scenario analysis model methodology for sustainable lending in terms of goals setting products and incentive systems (Korobeynikov, 2024). Green projects and loans are aimed at mitigation and adaptation to climate risk thus minimizing potential financial losses. The concept of green and sustainable banking has sparked different reactions in different countries.

Different markets are at different levels in implementation of sustainable banking programs.

China for example has adopted a policy-based approach to sustainable banking to help tackle profound environmental problems and support the transition to a green inclusive and resilient sustainable growth path. In Indonesia, Otoritas Jas Keuangan (OJK), the Indonesia Financial Services Authority, launched a sustainable Road Map in December 2014 which enlists the financial sector players to contribute to the national commitment to address climate change and support the transition to a competitive low carbon economy. In Mexico, the Mexican Banking Association has led a voluntary industry approach through the development of a Sustainability Protocol which was formally signed by Mexican banks in April 2016, aligning with national priorities such as government climate change targets for the next 15 years and endorsed by relevant Mexican government agencies. In South Africa, Green finance can be traced back to 1990 with early partnerships like the 1990 establishment of [The Green Trust](#) between Nedbank and WWF-South Africa. In Nigeria, Green banking principles were introduced in 2012 when the Nigerian Sustainable Banking Principles (NSBP) were developed in partnership with the Central Bank of Nigeria (CBN) (Alabi et al., 2023).

In Kenya, any adverse weather causes an adverse trigger on the availability of food for the population. This in turn depletes savings and causes an inverse relationship between savings and investments. Banks are creditors, investors, advisors and heads of the supply chain, therefore, exponential corporate emissions reduction could follow their practices that influence client and supplier networks (D. Bowman, 2010). Banks therefore have the potential to mitigate risks and facilitate adaptation to nature and climate related risks. In Kenya, the sustainability agenda in

the banking industry was launched by KBA (Kenya Bankers Association) in 2012. In year 2015, the SFI (Sustainable Finance Institutions) guiding principles were adopted by the banking industry. Climate change act was introduced in Kenya in the year 2015. In April 2025, Kenya Green Finance Taxonomy (KGFT) was officially introduced by the Central Bank of Kenya (CBK).

Evidence (Abrantes & Ström, 2023), reveals that policies and practices are set to prevent financial and environmental rebound as they are symbiotic. Various studies in different parts of the world have been conducted to explain the relationship between green banking, ESG and bank performance. Some authors (Hossain et al., 2020) (Aslam & Jawaid, 2022) (Zhang et al., 2022) have found a positive relationship between bank performance and green banking practices. A study by (Aslam & Jawaid, 2022) emphasizes that green banking adoption practices have a positive impact on environmental performance, operational performance and financial performance. Some studies (Velte, 2017) (M. H. Shakil et al., 2019) (Aydoğmuş et al., 2022) show that robust ESG can improve financial performance including profitability, market performance and operational efficiency. On the contrary, other studies, (Ratnasari et al., 2021) (Zhang et al., 2022) have found a negative relationship. A study done by (Di Tommaso & Thornton, 2020) shows a negative relationship between green banking and bank performance. A study conducted by (Salem et al., 2024) recorded inconsistent results regarding ESG and financial performance while other studies

(Putri et al., 2022) (Lamanda & Tamásné Vőneki, 2024) (Salem et al., 2024) (X. Shan et al., 2024) find a neutral relationship and suggest the need for further studies regarding the interaction between ESG and bank performance. The difference in the findings may be explained by methodology, context and time differences. This study aims at investigating mediating role of ESG on the interaction between climate risk mitigation measure (green banking) and performance of commercial banks in Kenya.

### **Research Objective**

To investigate the mediating role of ESG on the interaction between green banking and financial performance of commercial banks in Kenya.

### **Research Question**

What is the mediating role of ESG on the interaction between green banking practices and financial performance of commercial banks in Kenya?

The rest of the paper is structured as follows: - Section 2 presents the literature review, outlines the variables, demonstrates how the variables are operationalized and describes the research hypothesis. Section 3 describes the theoretical foundation. Section 4 explains data collection and analysis, shows the relationship between variables and provides the results and discussions. Finally, section 5 provides conclusions, limitations, policy recommendations and suggestion for further research.

## 2.0 Literature Review

**F**inancial performance emerges as a pivotal mediating factor linking systemic risk reduction to ESG performance (H. U. Rahman et al., 2023). By mitigating systemic risks, companies enhance their financial performance which subsequently fuels the development of ESG practices (Bax et al., 2024) (Bax et al., 2023). Companies with strong ESG performance are increasingly sought after by socially responsible investors.

A solid ESG profile can reduce borrowing costs and improve access to capital markets. A study conducted by (Salem et al., 2024) recorded inconsistent results regarding ESG and financial performance. While some studies (Shakil et al., 2019) (Aydoğmuş et al., 2022) (Velte, 2017) show that robust ESG can improve financial performance, including profitability market performance and operational efficiency show a positive relationship, a study done by (Di Tommaso & Thornton, 2020) shows a negative relationship while other studies (Lamanda & Tamásné Vőneki, 2024) (Salem et al., 2024) (Shan et al., 2024) find a neutral relationship and suggest the need for further studies regarding the interaction between ESG and bank performance. Evidence (Abrantes & Ström, 2023), reveals that policies and practices are set to prevent financial and environmental rebound as they are symbiotic. A study by (Aslam & Jawaid, 2022) emphasizes that green banking adoption practices have a positive impact on environmental performance, operational performance and financial performance. Therefore, pressure from stakeholders, risk minimization and reputation, influence adoption of green banking practices. According to (Sharma et al., 2024) banks and policy makers can foster a more sustainable and inclusive financial system that benefits society, the economy and the environment by embracing sustainability as a strategic imperative and collaborative with stakeholders. According to (Pohorelenko, 2025) incorporating ESG in banking operations creates a competitive advantage and improves resilience to external risks. Additionally, banks are able to meet regulatory requirements, form partnerships with international financial institutions thus increasing customer confidence, attract international investors and comply with global requirement and long term development. A study done on European banks by (Horobet et al., 2025) revealed that an improved

environmental and social performance leads to higher ROE and lower beta coefficients, while higher governance scores depress ROE.

### 2.1 Green Banking Practices

Green banking refers to activities that promote environmentally friendly practices and reduction of scope 1, scope 2 and scope 3 emissions. According to (Md. H. Rahman et al., 2023) green banking, also referred to as sustainable banking is a transformative approach which seeks to integrate environmental and social considerations into banking practices. Green banking aims at providing products and services

that minimize negative impacts on the environment while at the same time improving the efficiency and effectiveness of resource utilization, in order to foster a prosperous, equitable, and sustainable world (Mir & Bhat, 2022). Green banking helps reduce carbon footprint from banks processes and products. Banks therefore include environmental factors into their operations, both internally and externally (Sharma & Choubey, 2022).

#### 2.1.1 Operationalization of the variable

From existing literature green banking may be broken down in to activities as shown below: -

**Table 2.1: Green Banking Indicators**

Indicators	Existing Literature
<ul style="list-style-type: none"> <li>▪ Online banking</li> <li>▪ Online financing practices</li> </ul>	<ul style="list-style-type: none"> <li>▪ (Chowdhury, 2023)</li> <li>▪ (Asim Ali Bukhari et al., 2019)</li> </ul>
<ul style="list-style-type: none"> <li>▪ Mobile banking</li> <li>▪ Automated teller services</li> <li>▪ Disclosure policies</li> <li>▪ Green procurement</li> <li>▪ Incorporating ESG practices in lending</li> <li>▪ Reducing carbon foot print in internal operations</li> <li>▪ Energy efficiency</li> <li>▪ Green operational daily practices</li> <li>▪ Green loans</li> <li>▪ Green projects</li> <li>▪ Training</li> </ul>	<ul style="list-style-type: none"> <li>▪ (Chowdhury, 2023)</li> <li>▪ (Asim Ali Bukhari et al., 2019)</li> <li>▪ (Hossain et al., 2020)</li> <li>▪ (Kishore et al., 2020)</li> <li>▪ (Bowman, 2010)</li> <li>▪ (Nath et al., 2014)</li> <li>▪ (Weber et al., 2015)</li> <li>▪ (Park &amp; Kim, 2020)</li> <li>▪ (Kawabata, 2019)</li> <li>▪ (Tara et al., 2015)</li> <li>▪ (Shaumya &amp; Arulrajah, 2016)</li> </ul>

## 2.2 Environmental Social and Governance (ESG)

ESG refers to Environmental, Social, and Governance. The environmental pillar focuses on the planet and addresses nature related risk and climate related risks. The social pillar focuses on the people thus evaluating a company's sustainability and societal impact, particularly in investing. It considers a company's impact/relationships with employees, customers, and communities. The governance pillar focuses on strategy and leadership. Businesses adopt ESG principles to attract investors, build customer loyalty, and ensure long-term success while fostering a more transparent and sustainable future.

### 2.2.1 Operationalization of the variable

From existing literature ESG may be broken down in to activities as shown below: -

**Table 2.2 Environmental Social and Governance (ESG) Indicators**

Indicators	Existing Literature
<ul style="list-style-type: none"> <li>▪ Environmental – energy consumption, water usage, waste management, carbon footprint</li> </ul>	<ul style="list-style-type: none"> <li>▪ (Ben Ali &amp; Chouaibi, 2024)</li> <li>▪ (Salem et al., 2024)</li> <li>▪ (Cantero-Saiz et al., 2024)</li> </ul>
<ul style="list-style-type: none"> <li>▪ Social – employee diversity. Workplace safety, community engagement/CSR, labour practices, customer privacy, employee training, financial inclusion.</li> <li>▪ Governance – Board diversity (percentage of female Board members), Corporate ethics, Disclosures in reporting, Auditors</li> </ul>	<ul style="list-style-type: none"> <li>▪ (Velte, 2017) (Velte, 2023)</li> <li>▪ (Injeni et al., 2019) stakeholder and legitimacy theories, to analyze the extent to which 'integrated reporting' information is currently being disclosed by Kenyan listed companies and to investigate the firm-level factors associated with the disclosures.\nDesign/ methodology/approach – The study relies on content analysis procedures to assess the level of disclosure of integrated reporting information in the annual reports (2010-2016)</li> <li>▪ (Mbithi et al., 2020)</li> </ul>

## 2.3 Financial Performance

Financial performance involves evaluation of a company's assets, liabilities, equity, expenses, revenue, and profitability. A bank's financial performance is measured by its ability to generate profits and reduce credit risks among other measures. Some of the indicators used include return on assets and non-performing loans.

### 2.3.1 Operationalization of the variable

**Table 2.3: Financial Performance Indicators**

Indicators	Existing Literature
<ul style="list-style-type: none"> <li>▪ ROA (An accounting measure/ratio which utilizes financial statements to determine the financial health of a firm)</li> <li>▪ NPL Ratio (A ratio that measure the value of nonperforming loans as a percentage of gross/total loans)</li> </ul>	<ul style="list-style-type: none"> <li>▪ (Rolle et al., 2020)</li> <li>▪ (Chung &amp; Pruitt, 1994)</li> <li>▪ (Lindenberg &amp; Ross, 1981)</li> <li>▪ (Tobin, 1969)</li> <li>▪ (Singh et al., 2018)</li> <li>▪ (Boungou &amp; Urom, 2023)</li> <li>▪ (Jo et al., 2015)</li> <li>▪ (Cui et al., 2018)</li> <li>▪ (Waddock &amp; Graves, 1997)</li> </ul>

### 2.4 Control Variables

Control variables are factors that are held constant to prevent them from influencing the relationship between the main variables of interest. Control variables in this case were ownership, age, liquidity, interest rate and inflation.

#### 2.4.1 Operationalization of the variable

**Table 2.4: Control Variables**

Indicators	Existing Literature
<ul style="list-style-type: none"> <li>▪ Ownership</li> <li>▪ Age</li> <li>▪ Liquidity</li> <li>▪ Interest rate</li> <li>▪ Inflation</li> </ul>	<ul style="list-style-type: none"> <li>▪ (Dellis &amp; Papanikolaou, 2009)</li> <li>▪ (Sufian, 2009) (Rizwan et al., 2018)</li> <li>▪ (Alber, 2016) (H. Phan et al., 2016)</li> <li>▪ (Wagdi &amp; Salman, 2022)</li> </ul>

The study will test the following hypothesis: -

- $H_0$  *The interaction between green banking practices and financial performance of commercial banks in Kenya is not mediated by ESG (Environmental Social and Governance).*
- $H_1$  *The interaction between green banking practices and financial performance of commercial banks in Kenya is mediated by ESG (Environmental Social and Governance).*

## 3.0 Theoretical Foundation

### 3.1 Stakeholder Theory

**A**lthough financial performance favours the shareholders, stakeholders' demand for risk disclosures concerning nature related financial risks is rising (Arian & Sands, 2024). Stake holders include customers, regulator, investors and communities and employees.

The theory helps understand how various stake holders exert pressure on banks to adopt ESG and green banking practices. The stakeholder theory will help in understanding stakeholder demands in mitigating for and adaptation to climate and nature related financial risks. In this multifaceted study, stakeholder theory is useful in handling climate risks in companies as it will result in collaboration among various shareholders (Mhlanga & Moloji, 2020).

### 3.2 Resource Based View

The resource-based view (RBV) identifies a firm's internal resources and capabilities as the primary drivers of competitive advantage. It's a framework that companies can use to identify their valuable, rare, inimitable and non-substitutable (VRIN) resources. The resource based view highlights how internal capabilities such as resources, technology and culture may be leveraged to create competitive advantage.

(Hart, 1995) noted that the resource based view of the firm had, acknowledged and laid emphasis on the political, economic, social and technological aspects of the firm but was however not cognizance of the natural resources. (Hart, 1995), brings out the aspect of competitive advantage that firms can realize through pollution prevention, product stewardship and sustainable development. By embracing the resource based view theory, sustainable success can be achieved through strategic frameworks that identify company's strength and opportunities especially in ESG and green banking adoption. The theory captures how internal capabilities can be used to leverage behaviour and adapt to external pressures.

### 3.3 Institutional Theory.

Institutional theory was proposed by John Meyer and Brian Rowan in 1977. The theory was further developed by (Zucker, 1977) (DiMaggio & Powell, 2000), who significantly contributed to its development. (Pilbeam et al., 2012) explain how organizational structures and behaviours are shaped by broader societal norms, rules, and external pressures to gain legitimacy, rather than solely by functional efficiency. Institutional theory helps

understand ways in which external pressures shape organizational behavior such as adoption of green banking practices in the banking sector (Bukhari et al., 2020). To reduce escalation of nature and climate related risks affecting the banking sector, banks may employ measures that integrate climate risk into their core risk management and credit risk models. This can be done by implementing environmental Social and Governance practices in processes and products.

## 4.0 Data Methodology and Results

### 4.1 Data collection and analysis

**S**econdary data on variables under investigation was collected from the banks websites and Africa Financials website. Data collected was for a period of 13 years from year 2012 to year 2024. The choice of year 2012 was informed by the time when SFI (Sustainable Finance Institutions) journey in the Kenyan Banking industry began (see appendix figure 1).

The period runs up to year 2024 due to availability of audited books of financial accounts. To examine the mediating role of ESG on the interaction between green banking practices and bank performance, the study used mediation analysis. A Mediator Variable (M), also called “intervening or process variable”, is the variable that causes mediation in the relationship between the dependent variable/outcome(Y) and the independent variable/causal variable(X) (Muller et al., 2005). A mediation model therefore, identifies and explains the mechanism that underlies an observed relationship between independent and dependent variable through the inclusion of a third variable known as a mediator. Based on the findings of (Baron & Kenny, 1986) there are three sets of regression: -

*i)  $x \rightarrow y$    ii)  $x \rightarrow m$    and iii)  $x + m \rightarrow y$*

An intermediate variable helps explain how an independent variable influences an outcome variable (Hayes, 2018) (Hayes, 2015). In order to test the mediating role of ESG on the interaction between green banking and financial performance of commercial banks in Kenya, the study analyzed the following regression paths:

$$\beta_0 + \beta_1 X + \varepsilon; \quad x \rightarrow y \dots c \text{ path}$$

$$M = \beta_0 + \beta_1 X + \varepsilon; \quad x \rightarrow m \dots a \text{ path}$$

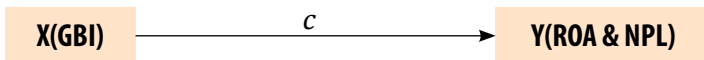
$$Y = \beta_0 + \beta_1 M + \varepsilon; \quad m \rightarrow y \dots b \text{ path}$$

$$Y = \beta_0 + \beta_1 X + \beta_2 M + \varepsilon; \quad x \rightarrow m \rightarrow y \dots c' \text{ path}$$

Where  $X$  is the independent variable (Green banking practices).  $Y$  is the dependent variable (Bank performance).  $M$  is the mediator variable (ESG).  $\beta_0$  is the y intercept.  $\beta_1, \beta_2 \dots$  represent the regression coefficients and  $\epsilon$  represents the error term.

### Conceptual Diagram

The mediated effect here implies that the independent variable  $X$  causes the mediator  $M$ , which in turn causes the dependent variable  $Y$ .



$$\beta_0 + \beta_1 X + \epsilon; \quad x \rightarrow y \dots c \text{ path}$$

The diagram above shows a direct path without mediators.

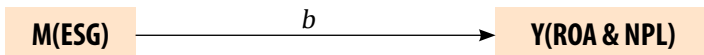
In examining a mediational hypothesis, the relationship between an independent variable  $X$  and a dependent variable  $Y$  is decomposed into two causal paths where one path links the independent variable to the dependent variable directly (the direct effect) and the other path links the independent variable to the dependent variable through a mediator (the indirect effect)



$$M = \beta_0 + \beta_1 X + \epsilon; \quad x \rightarrow m \dots a \text{ path}$$

The diagram above shows the path from the independent variable (GBI) to the mediator (ESG).

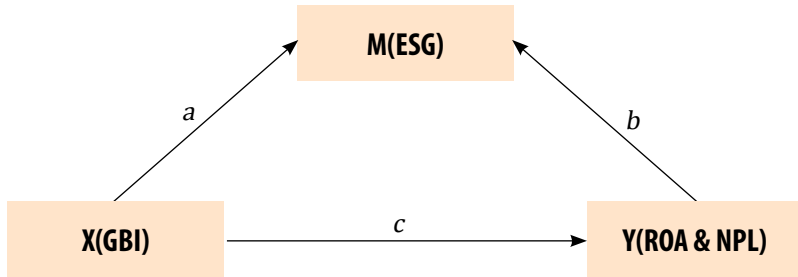
In a mediational hypothesis, it is typically assumed that statistical adjustment for a third variable (the mediator variable) reduces the magnitude of the relationship between the independent and the dependent variables.



$$Y = \beta_0 + \beta_1 M + \epsilon; \quad m \rightarrow y \dots b \text{ path}$$

The diagram above shows the path from the mediator variable (ESG) to the dependent variable (ROA & NPL).

In a simple mediation model the effect of the focal antecedent ( $x$ ) on the outcome ( $y$ ) is influenced by a mediator ( $m$ ). Mediation explains how or why two other variables are related. The diagram below shows the mediation path from the independent variable (GBI) to the mediator (ESG) to the dependent variable.



$$Y = \beta_0 + \beta_1 X + \beta_2 M + \varepsilon; \quad x \rightarrow m \rightarrow y \dots c' \text{ path}$$

Where  $C'$  is the direct effect of  $X$  on  $Y$ , conditional on  $M$ ;  $a*b$  is the indirect effect of  $X$  on  $Y$ ;  $c' + (a*b)$  is the total effect of  $X$  on  $Y$ .

In this study, the tests involved estimating the path model simultaneously using regression models to determine whether  $x$  predicts  $m$ , whether  $m$  predicts  $y$  and the significance and direction of the relationship. To test the research hypothesis, we used balanced panel regression model. Mediation analysis was conducted to test whether ESG performance (Per\_ESG) mediates the relationship between green banking initiatives (Per\_GBI) and firm financial performance measured by Return on Assets (ROA) and Non-performing Loans (NPL). A Generalized Structural Equation Model (GSEM) was employed, specifying two regression equations: path 1 showing effect of IV Per\_GBI and control variables on mediating variable (Per\_ESG), and path 2 predicting ROA/NPL from Per\_ESG, Per\_GBI, and the same controls. Both models assumed a Gaussian distribution with an identity link, suitable for continuous outcomes. Augmented ADF was used to determine whether the time series is stationary. Robust standard errors were used to ensure reliability.

The indirect effect was computed using the product of coefficients approach and Statistical significance was evaluated using z-tests and 95% confidence intervals. See appendix **figure 2, figure 3b** and **3d** for the summary of robust tests.

## 4.2 Results and Discussions

This section investigates the mediating effect of ESG on the relationship between green banking and financial performance of commercial banks in Kenya. The results are presented as follows: - First we present descriptive statistics and then we analyze the main investigation findings. Lastly we present the findings.

In order to arrive at the independent variable, green banking indicator (GBI) data was sourced from books of accounts and websites of commercial banks in Kenya. In order to arrive at an ESG factor, ESG was calculated by assessing a company's performance across environmental, social, and governance criteria. The data was collected from commercial banks' books

of accounts and company websites for a period of 13 years (2012 to 2024), and key performance indicators (KPIs) were scored and weighted. Scores were aggregated, and results were normalized to provide a comprehensive rating. Green banking indicator and ESG rating was arrived at based on publicly available information, public data and company disclosures from the bank's annual accounts. Criteria assessed from GRI (Global Reporting Initiative) and ISSB (International sustainability standards Board) and existing literature. ESG and GBI (green banking indicators) scores were recorded using a binary scoring method which categorised the indicators as presence (1) and absence (0). Refer to section 2, table 2.1 and table 2.2) for conceptualization of variable on Green banking and ESG respectively. A final score for each year per bank and percentage scores were obtained. Bank performance was assessed using return on assets and non-performing loans. Refer to section 2, table 2.3 and table 2.4 for conceptualization of the variables on bank performance and control variables respectively. The data that was collected was sorted to

eliminate companies that were incorporated after year 2012, companies that were merged during the study period and companies that had missing data during the study period.

### 4.3 Descriptive statistics

This section provides a summary of the descriptive statistics. The main variables for the entire sample are presented below. The mean on GBI and ESG performance are 4.2 and 8.75 respectively out of a maximum score of 9 and 15 respectively. Standard deviation on GBI and ESG was 2.4 and 4.6 respectively. From the descriptive statistics, commercial banks are still at an early stage in adoption of green banking and ESG practices. The standard deviation portrays a picture of both early adopters and late adopters with an indication that commercial banks in Kenya are at varying levels in green banking and ESG performance. Table 4.3.1 below provides summary of descriptive statistics on the dependent variable, independent variable, the mediating variable and the control variables.

**Table 4.3.1 Summary of Descriptive Statistics**

Variable		Mean	Std. dev.	Min	Max	Observations	
Averag~A	overall	1.08E+08	1.54E+08	0	1.02E+09	N	455
	between		1.39E+08	6482414	5.27E+08	n	35
	within		7.03E+07	-2.23E+08	5.97E+08	T	13
NPL	overall	8529130	1.78E+07	-156079	1.77E+08	N	442
	between		1.25E+07	455941.5	6.30E+07	n	35
	within		1.28E+07	-4.24E+07	1.22E+08	T-bar	12.6286



Variable		Mean	Std. dev.	Min	Max	Observations	
NPL <sub>ra~o</sub>	overall	14.64287	12.53492	-0.6454372	113.4921	N	449
	between		7.737412	3.021038	34.17379	n	35
	within		9.962647	-12.12912	109.0266	T-bar	12.8286
Size	overall	1.08E+08	1.54E+08	0	1.02E+09	N	455
	between		1.39E+08	6482414	5.27E+08	n	35
	within		7.03E+07	-2.23E+08	5.97E+08	T	13
Inflat <sub>~n</sub>	overall	6.446154	1.428572	4.7	9.6	N	455
	between		0	6.446154	6.446154	n	35
	within		1.428572	4.7	9.6	T	13
Liquid <sub>~y</sub>	overall	0.2	0	0.2	0.2	N	455
	between		0	0.2	0.2	n	35
	within		0	0.2	0.2	T	13
Profit <sub>~y</sub>	overall	7.933168	3.423246	-0.4459152	20.92421	N	450
	between		2.952568	2.841453	17.2737	n	35
	within		1.798344	1.096139	14.97874	T-bar	12.8571
Intere <sub>~e</sub>	overall	15.45769	1.970853	12.67	19.3	N	416
	between		0	15.45769	15.45769	n	32
	within		1.970853	12.67	19.3	T	13
GBI	overall	4.120879	2.431598	0	9	N	455
	between		2.307714	0	8	n	35
	within		0.853164	0.967033	6.428571	T	13
ESG	overall	8.753846	4.648061	0	15	N	455
	between		4.5447	0	14.30769	n	35
	within		1.223153	1.446154	18.90769	T	13

Variable		Mean	Std. dev.	Min	Max	Observations	
Lev	overall	0.9332396	0.2766359	0.4994594	3.326854	N	358
	between		0.2041735	0.7430045	1.810452	n	28
	within		0.1885497	0.1244549	2.449642	T-bar	12.7857
Growth	overall	0.115699	0.1618122	-0.2113871	1.932524	N	415
	between		0.0845949	-0.0061565	0.4751414	n	35
	within		0.1437789	-0.4118708	1.573082	T-bar	11.8571
Risk	overall	14.64287	12.53492	-0.6454372	113.4921	N	449
	between		7.737412	3.021038	34.17379	n	35
	within		9.962647	-12.12912	109.0266	T-bar	12.828

Assets; NPL-Non-performing loans; GBI- Green Banking Indicator; ESG- Environmental Social and Governance; Lev-Leverage

#### 4.4 Results

This section summarizes the results of the study, outlines and analyzes the estimation findings. This section also provides an in-depth interpretation of the resultant relationship between the variables.

**Table 4.4.1 Results**

Model	RE	FE	RE	FE	FE	RE	RE	RE
Dependent Variable	ROA	ROA	ESG	ROA	Log of NPL	Log of NPL	ESG	Log of NPL
Independent variables	Model 21	Model 22	Model 23	Model 24	Model 31	Model 32	Model 33	Model 34
Per_GBI	0.1229*** (0.010)	0.00 (0.005)	0.5616*** (0.026)	0.0142* (0.008)	-0.6884* (0.396)	-1.0405** (0.411)	0.5616*** (0.026)	(0.998) (0.680)
Per_ESG				-0.0197* (0.011)				(0.034) (0.961)
log_size		-0.0110*** (0.002)	(0.005) (0.004)	-0.0114*** (0.002)		1.2229*** (0.065)	(0.005) (0.004)	1.2103*** (0.065)
leverage_loans		0.0069** (0.003)	(0.009) (0.014)	0.0069** (0.003)		0.4240* (0.219)	(0.009) (0.014)	0.4283* (0.220)
log_profitability		0.0586*** (0.002)	0.0356*** (0.009)	0.0593*** (0.002)		0.16 (0.142)	0.0356*** (0.009)	0.15 (0.147)
CreditRisk		-0.0048** (0.002)	(0.004) (0.011)	-0.0049** (0.002)		0.5591*** (0.184)	(0.004) (0.011)	0.5663*** (0.185)
log_age		-0.0112*** (0.003)	(0.002) (0.008)	-0.0124*** (0.003)		0.05 (0.127)	(0.002) (0.008)	0.03 (0.124)
log_profitability = 0.		-	-	-		-	-	-



Model	RE	FE	RE	FE	FE	RE	RE	RE
Dependent Variable	ROA	ROA	ESG	ROA	Log of NPL	Log of NPL	ESG	Log of NPL
Independent variables	Model 21	Model 22	Model 23	Model 24	Model 31	Model 32	Model 33	Model 34
CreditRisk = 0,		-	-	-		-	-	-
TA_growth		0.00 (0.000)	(0.000)	0.00 (0.000)		-0.0329*** (0.003)	(0.000)	-0.0332*** (0.003)
Interest rate		0.1644*** (0.031)	(0.001)	0.1734*** (0.032)		0.00 (0.017)	(0.001)	0.00 (0.017)
Constant	0.0180*** (0.007)	-2.5740*** (0.499)	0.2749*** (0.073)	-2.7103*** (0.504)	13.9208*** (0.225)	-7.2040*** (1.191)	0.2749*** (0.073)	-6.9152*** (1.205)
Observations	449	294	294	294	440	293	294	293
Number of Company	35.00	25.00	25.00	25.00	35.00	25.00	25.00	25.00
R-squared within	0.23	0.90	0.75	0.90	0.62	0.70	0.75	0.69
R-squared between	0.40	0.38	0.87	0.35	0.27	0.73	0.87	0.73
R-squared Overall	0.34	0.49	0.83	0.46	0.13	0.69	0.83	0.70
R MSE	0.02	0.01	0.03	0.01	0.57	0.47	0.03	0.47
P value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mediating variable	No	No	No	Yes	No	No	Yes	Yes
Control variables	No	Yes	Yes	Yes	No	No	Yes	Yes
Fixed time effects	No	Yes		Yes	No	No	No	No
FE - Fixed effect model, RE - Random effect model								
Standard errors in parentheses								
*** p<0.01, ** p<0.05, * p<0.1								

Source: - Author

#### 4.4.1 Green banking improves performance

Model 21 shows the direct effect without control variables. The independent variable (GBI) to dependent variable (ROA). The results indicate that the relationship between green banking and return of assets (ROA) is statistically significant and positive. An increase in green banking performance leads to an increase in return on assets. The findings align with the resource based view and existing literature indicating that companies can develop frameworks to identify their valuable rare inimitable and non-substitutable resources such as technology and culture to enable them create a competitive advantage. Model 22: (Direct effect + control variables). The results are statistically significant. Model 23: (Indirect effect + control variables). The results are statistically significant. Model 24: (Overall

model; DV- ROA, IV - GBI, Mediating variable - ESG + control variables). This model tests the overall effect of green banking on ROA with ESG as a mediator. When Per\_ESG is added, the effect drops to 0.0142\*. The results suggest partial mediation. This could mean that ESG activities largely enhance business operating environment but accrue financial benefits in the future (medium term and long term). The finding corroborates the stake holder theory that organizations must from time to time learn and address the expectations and requirements of their stake holders, some of which have indirect financial benefits. Additionally, in line with the institutional theory, external pressure shapes organizational behaviour and impress on them to gain legitimacy rather than solely functional efficiency.

#### 4.4.2 Green banking reduces credit risk

Model 31 shows the direct effect without control variables. The independent variable (GBI) to dependent variable (NPL). The results are not statistically significant even though the relationship is negative. In model 32 when controls are introduced the relationship is significant and remains negative.  $Per\_GBI \rightarrow Log(NPL) = -1.3343^* \rightarrow \text{significant}$ . The findings therefore indicate that green banking reduces credit risk. This corroborates with resource based view that identifies internal resources and capabilities as the primary drivers of competitive advantage. In model 34 when ESG is included, effect is not significant. This implies that benefit of ESG performance may not accrue in the short run but rather may influence the current and future brand value. This aligns with the findings by (Aslam & Jawaid, 2022) emphasizes that green banking adoption practices have a positive impact on environmental performance, operational performance and financial performance. The findings are well aligned with the stakeholder theory in mitigating for and adapting to climate and nature related risks due to stake holder pressure.

#### 4.4.3 Mixed evidence for ESG as a mediator

In model 23  $Per\_GBI \rightarrow Per\_ESG = 0.5592^* \rightarrow ESG$  shows a statistically strong association with green banking. In model 24  $Per\_ESG \rightarrow ROA = -0.0197^* (SE = 0.0114) \rightarrow ESG$  has a limited mediating effect or neutral effect on performance and risk. In model 34  $Per\_ESG \rightarrow Log\ NPL = -0.4264 (NS)$ . ESG is statistically strongly associated with GBI. There is mixed evidence

of ESG as a mediator in the overall model. This aligns with the findings by (Di Tommaso & Thornton, 2020) that show a negative relationship while other studies (Lamanda & Tamásné Vőneki, 2024) risk and sustainability reports published by 26 banks located in four Central European countries (Czech Republic, Hungary, Poland and Slovakia (Salem et al., 2024) (Shan et al., 2024) find a neutral relationship on the interaction between ESG and bank performance. Environmental and Social activities largely incorporate external activities. Monitoring bank performance is a continuous process which sits at the core of strategy. ESG practices adopted by financial institutions have cost implications. Environmental and social activities have impact materiality. While E&S activities incur costs in the short run, benefits are not direct and immediate. Rather, such activities benefit society (People) and environment (Planet) and improves the operating environment from where organizations tap their resources. Therefore, while the benefits may not accrue during the financial reporting period, such benefits may be realised in the future reporting periods. The activities positively impact brand value in the medium term and long term.

#### 4.5 Limitations of the study

Banks in Kenya are at different levels in application and reporting of ESG and green banking practices. While some of the banks apply global reporting standards some of the reports available did not follow international ESG and green banking reporting which posed a challenge to data availability. A context based ESG and Green performance indicator that is specific to emerging markets and aligned to global reporting standards was missing in most reports.

## 5.0 Conclusion and Policy Recommendation

**T**his section provides a summary of conclusion, policy recommendations and suggestion for further research. The objective of the study was to investigate the mediating role of ESG on the interaction between green banking and financial performance of commercial banks in Kenya.

### 5.1 Conclusion

Given the concerns on commercial banks interaction with environment and society, continuous monitoring of this relationship remains important. Anchored on the stakeholder theory, institutional theory and the resource based view, the study emphasizes the need for banks to adapt to dynamic business environment. From the findings of this paper, green banking improves performance. By focusing on sustainability dimensions, banks become more resilient thus creating shareholder and investor value in the future. ESG is strongly associated with green banking and therefore as banks navigate/pursue ESG practices, they become greener in their operations and products. For the banking sector, ESG criteria is instrumental in identification, mapping and pricing of certain exogenous and endogenous risks, assets portfolios and operations. However, the mixed evidence of ESG as a mediator means that there could be delayed effects of ESG as a mediator on performance. It is therefore necessary for banks to project expected outcomes of E, S, and G granularly. This helps banks identify suitable models that can withstand emerging risks for each assessment. By focusing on sustainability dimensions, banks become more resilient thus creating shareholder and stakeholder value in the future. By embracing ESG, banks are able to navigate green banking more easily and look critically at banking sector specific climate and nature related risks and opportunities. From the findings in this study, green banking pays off.

## 5.2 Policy Recommendation

### 5.2.1 Banking sector

This paper encourages commercial banks to build capacity, embrace ESG criteria in assessment of their portfolios and determine risk levels at environmental, social and governance pillars. Banks should come up with risk models that identify benefits realizable in the short term, medium term and long term. This paper encourages banks to have auditable reporting framework on green banking and ESG. This paper persuades commercial banks to report on their green banking asset portfolios to allow performance measurement and benchmarking within and across industries.

### 5.2.2 Regulator

This paper persuades regulators to issue banks with a standard criterion for ESG and green banking reporting within the banking sector (sector specific). This paper encourages the regulator to develop prudential guidelines on Green banking and ESG reporting in order to breed uniformity in action, implementation, timelines and reporting.

### 5.2.3 Government

This paper persuades governments to propose a minimum percentage of green portfolio for each bank graduated in the short term, medium term and long term. Governments are encouraged to develop laws and regulations that enable commercial banks to provide finance for climate and nature related solutions in order to enable pathways towards net zero and climate risk resilient economies.

## 5.3 Suggestions for Further Research

This study has theoretical and practical implications for future research. While the focus of our study was to investigate the mediating role of ESG on the interaction between green banking and financial performance of commercial banks in Kenya, other studies could focus on market based measures such as Tobin's Q. It will also be beneficial to investigate the interaction between counter party ESG performance and green banking performance. Other studies may also focus on the interaction between green banking performance and cost of operations in the banking sector. Finally, a study that separates each pillar in ESG and investigates interaction with performance.

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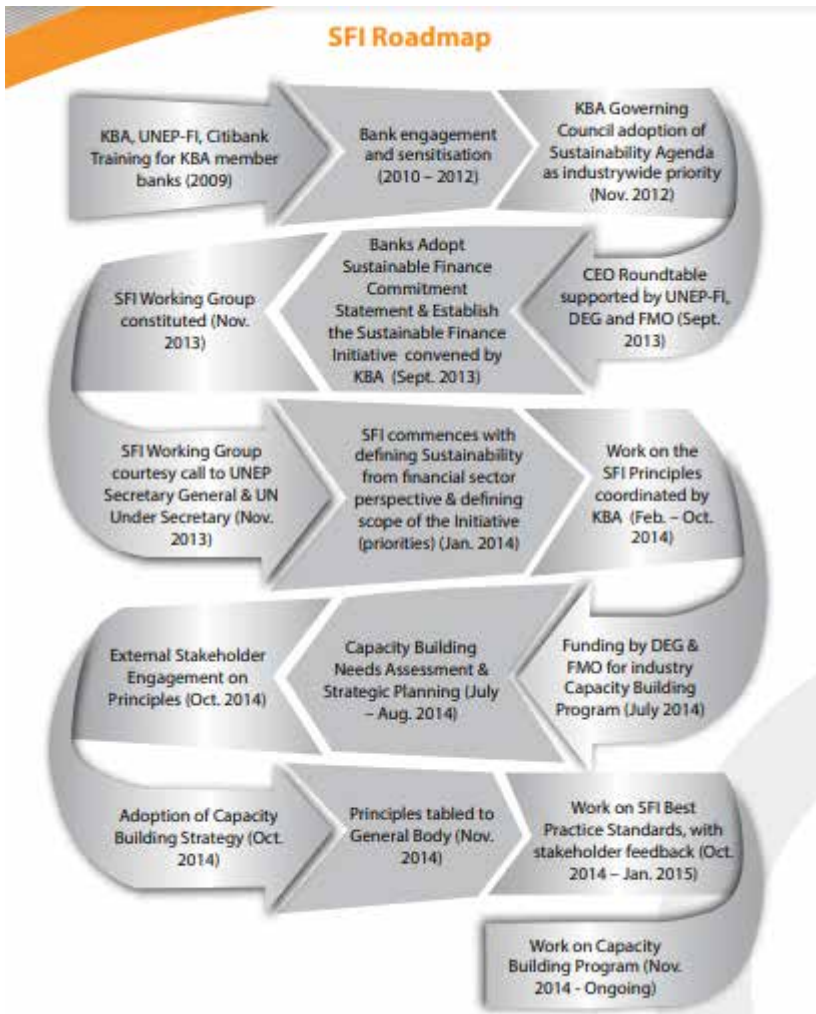


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## ANNEX

### Annex 1: Sustainable Finance Institutions Road Map in Kenya



**Annex 2: ADF- Augmented Dickey-Fuller Test**

Variable	Statistic		Value	P-value
ROA	Inverse chi-squared(70)	P	140.8845	0.0000
	Inverse normal	Z	-3.7008	0.0001
	Inverse logit t(179)	L*	-4.2323	0.0000
	Modified inv. chi-squared	Pm	5.9908	0.0000
log_npl	Inverse chi-squared(70)	P	141.6795	0.0000
	Inverse normal	Z	-2.0617	0.0196
	Inverse logit t(179)	L*	-3.2851	0.0006
	Modified inv. chi-squared	Pm	6.058	0.0000
Per_GBI	Inverse chi-squared(70) P		115.7932	0.0005
	Inverse normal	Z	-3.9228	0.0000
	Inverse logit t(154)	L*	-4.2193	0.0000
	Modified inv. chi-squared	Pm	3.8702	0.0001
Per_ESG	Inverse chi-squared(70) P		108.6456	0.0021
	Inverse normal	Z	-3.7933	0.0001
	Inverse logit t(159)	L*	-3.9114	0.0001
	Modified inv. chi-squared	Pm	3.2661	0.0005
log_size	Inverse chi-squared(70)	P	278.1115	0.0000
	Inverse normal	Z	-5.9234	0.0000
	Inverse logit t(179)	L*	-10.0142	0.0000
	Modified inv. chi-squared	Pm	17.5886	0.0000
leverage_loans	Inverse chi-squared(70)	P	94.793	0.0259
	Inverse normal	Z	-1.0732	0.1416
	Inverse logit t(179)	L*	-1.425	0.0780
	Modified inv. chi-squared	Pm	2.0954	0.0181
log_profitability	Inverse chi-squared(70)	P	127.5382	0.0000
	Inverse normal	Z	-2.2506	0.0122
	Inverse logit t(179)	L*	-2.7622	0.0032
	Modified inv. chi-squared	Pm	4.8629	0.0000



Variable	Statistic		Value	P-value
CreditRisk	Inverse chi-squared(56)	P	116.2631	0.0000
	Inverse normal	Z	-3.1849	0.0007
	Inverse logit t(144)	L*	-3.7834	0.0001
	Modified inv. chi-squared	Pm	5.6943	0.0000
log_age	Inverse chi-squared(70)	P	2011.9982	0.0000
	Inverse normal	Z	-40.9848	0.0000
	Inverse logit t(164)	L*	-98.1787	0.0000
	Modified inv. chi-squared	Pm	164.1288	0.0000
TA_growth	Inverse chi-squared(70)	P	182.4417	0.0000
	Inverse normal	Z	-4.2735	0.0000
	Inverse logit t(179)	L*	-6.3201	0.0000
	Modified inv. chi-squared	Pm	9.5031	0.0000
Interest_rate	Inverse chi-squared(64)	P	416.6331	0.0000
	Inverse normal	Z	-16.8013	0.0000
	Inverse logit t(164)	L*	-20.3609	0.0000
	Modified inv. chi-squared	Pm	31.1687	0.0000

Source: Author

### Annex 3(a): NPL Summary Results\

```

Iteration 0: log pseudolikelihood = 234.93895
Iteration 1: log pseudolikelihood = 234.93895

Generalized structural equation model                                Number of obs = 294

Response: Per_ESG                                                Number of obs = 294
Family: Gaussian
Link: Identity

Response: log_npl                                                Number of obs = 293
Family: Gaussian
Link: Identity

Log pseudolikelihood = 234.93895

```

**Annex 3(b): Robust Tests**

	Coefficient	Robust std. err.	z	P> z	[95% conf. interval]	
<b>Per_ESG</b>						
Per_GBI	.5607201	.0196091	28.59	0.000	.522287	.5991531
log_size	-.0025003	.0019422	-1.29	0.198	-.006307	.0013063
leverage_loans	-.0204513	.0113389	-1.80	0.071	-.0426752	.0017726
log_profitability	.024276	.0063549	3.82	0.000	.0118207	.0367313
CreditRisk	-.0094896	.0088022	-1.08	0.281	-.0267416	.0077624
log_age	.006272	.0033639	1.86	0.062	-.0003211	.0128651
TA_growth	-.0001091	.0002233	-0.49	0.625	-.0005468	.0003286
Interest_rate	-.0002114	.0012286	-0.17	0.863	-.0026195	.0021967
_cons	.236113	.0386406	6.11	0.000	.1603789	.3118472
<b>log_npl</b>						
Per_ESG	1.016151	.8046515	1.26	0.207	-.5609367	2.593239
Per_GBI	-.1980124	.6107447	-0.32	0.746	-1.39505	.9990253
log_size	.9373753	.0313876	29.86	0.000	.8758567	.998894
leverage_loans	1.749648	.2338933	7.48	0.000	1.291226	2.20807
log_profitability	-.2903232	.1285411	-2.26	0.024	-.5422591	-.0383874
CreditRisk	.2239381	.4000565	0.56	0.576	-.5601583	1.000034
log_age	-.239515	.0551067	-4.35	0.000	-.347522	-.1315079
TA_growth	-.0430658	.0042598	-10.11	0.000	-.0514149	-.0347167
Interest_rate	-.0259899	.0251467	-1.03	0.301	-.0752764	.0232967
_cons	-1.145738	.804062	-1.42	0.154	-2.721671	.4301945
var(e.Per_ESG)	.0014555	.0001947			.0011197	.0018919
var(e.log_npl)	.4797992	.058994			.3770504	.6105477

. nlcom (\_b[Per\_ESG:Per\_GBI]) \* (\_b[log\_npl:Per\_ESG])

\_nl\_1: (\_b[Per\_ESG:Per\_GBI]) \* (\_b[log\_npl:Per\_ESG])

	Coefficient	Std. err.	z	P> z	[95% conf. interval]	
_nl_1	.5697764	.4514494	1.26	0.207	-.3150482	1.454601



### Annex 3(c): ROA

```

Iteration 0: log pseudolikelihood = 1524.7982
Iteration 1: log pseudolikelihood = 1524.7982

Generalized structural equation model                                Number of obs = 294

Response: Per_ESG
Family: Gaussian
Link: Identity

Response: ROA
Family: Gaussian
Link: Identity

Log pseudolikelihood = 1524.7982
  
```

### Annex 3(d): Robust Tests

	Coefficient	Robust std. err.	z	P> z	[95% conf. interval]	
<b>Per_ESG</b>						
Per_GBI	.5607201	.0196091	28.59	0.000	.522287	.5991531
log_size	-.0025003	.0019422	-1.29	0.198	-.006307	.0013063
leverage_loans	-.0204513	.0113389	-1.80	0.071	-.0426752	.0017726
log_profitability	.024276	.0063549	3.82	0.000	.0118207	.0367313
CreditRisk	-.0094896	.0088022	-1.08	0.281	-.0267416	.0077624
log_age	.006272	.0033639	1.86	0.062	-.0003211	.0128651
TA_growth	-.0001091	.0002233	-0.49	0.625	-.0005468	.0003286
Interest_rate	-.0002114	.0012286	-0.17	0.863	-.0026195	.0021967
_cons	.236113	.0386406	6.11	0.000	.1603789	.3118472
<b>ROA</b>						
Per_ESG	.0031727	.0124178	0.26	0.798	-.0211658	.0275113
Per_GBI	.0002455	.0072162	0.03	0.973	-.013898	.014389
log_size	.0029703	.000425	6.99	0.000	.0021374	.0038032
leverage_loans	.0159215	.003321	4.79	0.000	.0094125	.0224304
log_profitability	.0670262	.003306	20.27	0.000	.0605466	.0735058
CreditRisk	-.0028356	.0028833	-0.98	0.325	-.0084868	.0028155
log_age	-.0001625	.0007963	-0.20	0.838	-.0017233	.0013982
TA_growth	.0000474	.0000511	0.93	0.354	-.0000528	.0001475
Interest_rate	.0003863	.0003097	1.25	0.212	-.0002207	.0009932
_cons	-.1206391	.0102436	-11.78	0.000	-.1407162	-.1005621
var(e.Per_ESG)	.0014555	.0001947			.0011197	.0018919
var(e.ROA)	.0000737	.0000109			.0000552	.0000984



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