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## The Effect of ESG on the Financial Sector

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The Effect of ESG on the Financial Sector

A Dissertation

Submitted to the Graduate Faculty of the  
University of New Orleans  
in partial fulfillment of the  
requirements for the degree of

Doctor of Philosophy  
in  
Financial Economics

by

Asaad Sendi

B.S. Tennessee State University, 2017  
M.B.A. Tennessee State University, 2019  
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May 2024

## **Dedication**

To my parents, Mehdhar and Sameerah, my wife Abeer, my siblings Mohammed, Aisha, Samah, Salaha, Halah, Ahmad, and Abdulrahman, as well as my two lovely kids, Wateen, and Elias, I express my deepest gratitude for their love and support.

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I am also profoundly grateful to my beloved wife, cherished family members, supportive classmates, and dear friends. Their unwavering support, encouragement, and constructive feedback have been instrumental in shaping my academic pursuits and personal growth. Together, their collective encouragement has been a source of strength and motivation, for which I am deeply thankful.

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# **The Effect of ESG Scores on Bank Stability: Islamic vs. Conventional Banks**

## **Abstract**

This paper explores the intricate impact of ESG (Environmental, Social, and Governance) factors on the stability of banks across different continents, with a specific focus on distinguishing the effects on both conventional and Islamic banking institutions. Our comprehensive empirical analysis reveals a substantially positive influence of ESG activities on the stability of both types of financial institutions. Notably, after employing pooled and fixed estimator regressions, the findings highlight the significantly positive effect of lagged ESG scores on the stability of conventional and Islamic banks, signifying the potential for ESG performance to enhance their overall stability. Further examination shows that the environmental pillar score, particularly in the conventional banking sector, displays highly positive and statistically significant outcomes, emphasizing the constructive impact of environmentally responsible practices. Conversely, the social pillar exhibits a positive correlation with the z-score in the Islamic banking segment, indicating that banks actively involved in community service and social responsibility initiatives experience improved stability. In conclusion, our study underscores the transformative potential of ESG activities in positively shaping both the external perception and internal operations of banks, ultimately contributing to increased valuations and improved stability.

**JEL classification:** G21, G32, C62, M14, C53

**Keywords:** Banks, Bank risk-taking, Bank's Stability, Prediction models, CSR, ESG.



# Chapter 1

## 1. Introduction

Environmental, Social, and Governance (ESG) factors carry significant implications for the functioning of all types of business organizations. Financial institutions, including banks, are particularly susceptible to the potential impact of various ESG-related factors. Banks primarily engage in activities such as accepting deposits and providing loans to borrowers, which inherently reflect their risk-taking behavior and overall stability. Previous research suggests that governance models centered on shareholders can lead to increased risk-taking and influence the stability of banks (Srivastav & Hagedorff, 2015). This underscores the importance of considering ESG-based initiatives as potential mechanisms to protect the interests of diverse stakeholders and maintain a balance between investing and non-investing parties within the banking sector (Tommaso & Thornton, 2020).

According to stakeholder theory, firms and their stakeholders have a reciprocal relationship (Freeman, 2010). In order to improve firm valuation and stability, these companies should engage in activities which benefit their external environment. In the process, these firms are improving the environment for their stakeholders. Eventually, these positive actions help firms increase their value. Same is true for conventional and Islamic banks. ESG activities can positively influence the external environment and can greatly impact the internal operations of banks, which in turn will increase bank valuations while improving stability.

Financial institution, especially banks, were the center of 2007-2008 financial crisis due to their involvement in toxic and complex products (DeYoung et al., 2013; Brunnermeier, 2009; Hurley et al., 2014). The aftermath of the 2008 Financial Crisis had long-term consequences for the banking industry and financial regulation (Brunnermeier, 2009). Therefore, it is very

imperative to understand if ESG plays any role and protect the bank against default risk and restrict them involving in excessive risk-taking behavior through different channels of ESG. The extant literature addressing the correlation between ESG factors and bank stability has revealed a nuanced, non-linear relationship (Azmi et al., 2021). Nevertheless, only a few studies have undertaken the critical task of distinguishing between Islamic and conventional banks before delving into the analysis of how ESG factors influence the operational dynamics and stability of these banks. Our research bridges this gap by conducting a comprehensive examination of the influence of ESG on bank stability, with a specific focus on differentiating its effects on conventional and Islamic banks across all five continents.

It is vital to grasp the fundamental distinction between conventional and Islamic banks since their operational methodologies significantly vary. For instance, conventional banks collect most of their earnings from interests earned from outstanding loans given to borrowers. On the other hand, Islamic banks do not operate on an interest basis as it is against the sharia laws, which means they focus mainly on the profits and losses earned from different banking operations. Moreover, Islamic finance represents a financial system founded on the principles of Shariah and Islamic teachings, adhering strictly to its core tenets, thereby constituting a Shariah-compliant financial system (Gait & Worthington, 2008). This entails a prohibition against investments or financing activities that contradict Islamic law, categorizing them as "Haram" or unlawful in Islam, including the production of alcohol, tobacco, involvement in gambling industries, investment in the pornography sector, and high-leverage business entities (Abderrezak, 2010). This distinctive approach extends to the realms of impact investing and sustainability performance. Previous research has indicated that financial institutions bearing the "Islamic" label tend to exhibit a higher degree of environmental and social responsibility (Qoyum et al., 2022). Furthermore, Islamic

banks place a strong emphasis on social responsibility due to their avoidance of Riba (interest), their commitment to profit/loss sharing, and risk-sharing practices, as well as their dedication to justice and inclusion through mechanisms like zakat.

These inherent disparities underscore the significance of separately studying the impact of ESG on both Islamic and conventional banks. Additionally, it is essential to assess the integration of ESG principles into lending, investing, and day-to-day operational activities distinctly for these two categories of financial institutions. Lastly, the financial crisis has taught us to diligently focus on bank stability. This motivates us to examine the influence ESG has on Islamic and conventional banks' operational activities as well as investigate separately the impact of ESG on banking stability for both financial institutions.

Our empirical findings affirm that ESG scores exert a noteworthy and beneficial influence on the stability of conventional banks. This positive impact of ESG scores persists even when accounting for bank-specific and macroeconomic control variables within our models. Consequently, we contend that ESG performance, in its entirety, exerts a constructive influence on the operational efficacy, performance, and guiding principles of conventional banks. Furthermore, shareholders actively endorse ESG-related initiatives undertaken by these banks. In addition, the results show that the loan ratio variable has recorded significant positive effect on conventional banks' stability. Moreover, ESG can provide extensive information on conventional banks' potential loan losses and default probability of outstanding loans. Also, GDP growth variable has a strong significant positive effect on conventional banks' stability. The prior two variables show that inclusion of ESG by conventional banks during a good economic climate enhances the banks' ability to meet the high demand on loans by potential borrowers while

maintaining stability. Hence, ESG has a significant effect on the bank value and general stability of conventional banks.

On the other hand, Islamic banks are inclined more towards the governance of the Islamic sharia, which provides the general outline of how the banks should operate (Daugaard, 2019). Our findings offer compelling evidence that ESG scores exhibit a significant positive correlation with and influence over the operational activities and stability of Islamic banks. This suggests that substantial ESG scores are closely linked to a decrease in the risk appetite of these banks, a relationship that is further nuanced by the characteristics of their executive boards. This discovery aligns with the research by Mingjie He (2022), which underscores the notion that a more extensive incorporation of ESG practices is associated with a notable reduction in the risk profile of banks.

We extend the analysis of this paper by investigating each ESG pillar (Environmental, Social, and Governance) separately to understand the relationship between ESG characteristics and banks' stability by measuring any change in banks' z-scores. In addition, in our regressions we control for all bank and macroeconomic characteristics with each ESG pillar score to account for economic development strategies, legal systems, geographic magnitude, enforcement of rules and regulations in the economy as well as fiscal and monetary policies adopted by relevant authorities.

While analyzing the relationship between Islamic banks' stability and each of ESG pillars, we find that the lagged environmental pillar  $E_{t-1}$  in the Islamic segment does not have any significant correlation towards bank stability. Conversely, it's worth noting that the environmental pillar yields notable outcomes within the conventional banking segment. This suggests that conventional banks actively engage in environmentally friendly practices, which ecologically responsible activities play a pivotal role in bolstering the stability of conventional banks, emphasizing the positive

impact of environmentally conscious practices on their overall financial well-being (Azmi et al., 2021; Miralles-Quirós et al., 2019; Velte, 2017). Furthermore, our findings highlight a positive, causal, and non-linear relationship between Islamic banks and social pillar ( $S_{t-1}$ ). We endorse the argument that Islamic finance plays a crucial role in achieving greater social sustainability and the associated advantages. Our social pillar score includes human rights, labor, and community services. Any aforementioned event will positively impact the bank stability as long as banks are being proactive members to their neighbors and actively serve the communities.

Finally, ESG can improve banks' area of operations and help fulfill the general guidelines that the banks need to follow. Every bank operates based on these guidelines and needs to formulate a strategy that incorporates environmental, social, and governance factors. The financial crisis in 2008 indicates that the bank's value and efficiency depend on the state of the ESG factors (Hill, 2020). Different stakeholders in the banking industry need to ensure that banks develop plans and strategies that contain various ESG components (Hurley et al., 2014).

The primary contribution of this paper is to identify the importance of ESG for both conventional and Islamic financial institutions. Previous studies mostly focus on the effect of ESG on conventional banks operating in one continent (Chiaramonte et al., 2022; Velte, 2017). Therefore, our study fills this gap by making a dual contribution. Firstly, we utilized a comprehensive dataset encompassing all five continents, ensuring a global perspective. Secondly, we conducted a comparative analysis between Islamic and conventional banks to discern whether the impact of ESG practices remains consistent across these banking types or, conversely, exhibits variations. The empirical evidence in this paper will help policymakers, bank stakeholders, and board members of both Islamic and Conventional banks to make more informed decisions.

This paper proceeds as follows. First, we collect all relevant literature on ESG, conventional and Islamic banks to develop our hypotheses in Section 2. Second, we describe our research design in Section 3 and explain our empirical results in Section 4. Finally, in Section 5, we provide summary and conclusions.

## **2. Literature Review**

Existing theoretical literature on ESG and organizations focuses on showing the impact of environmental, social and governance pillars on financial performance of these firms (Peng & Isa, 2020). Authors find a positive impact of ESG on financial performance. Their results reveal that ESG coupled with Shariah screenings can increase firm value, moderate ethical dilemma, and improve transparency in their operational activities. Schanzenbach & Sitkoff (2020) summarize existing theories on ESG factors and provide evidence of benefits related to ESG investing. These authors document that risk-adjusted returns can be improved through implementation of ESG factors. Azmi et al. (2021) analyzes the relationship between bank value and ESG factors and shows that environmentally friendly activities by banks help increase their value. Similarly, Agnese et al. (2023) uses GMM to study the effects of Governance pillar of ESG on ESG-controversies and report that there exists a positive relationship between the two.

According to Freeman (2010), stakeholder theory states that there exists a reciprocal relationship between the firm and its stakeholders. A firm's activities can have a significant impact on the well-being of its stakeholders. In order to increase firm value, it is essential for firms to engage in activities which will improve the well-being of their stakeholders. As ESG initiative can positively influence the well-being of the stakeholders, the contemporary literature on ESG suggests firms to include ESG factors in its operations to improve stakeholder well-being which ultimately helps the firm to increase its value. This is also true for financial institutions as they strive to improve their value.

Based on Freeman (2010) that the stakeholders' opinion of environmental, social, and governance claim that some firms have immoral commitment in maximizing the shareholders' value. In Michael & Kramer (2006) show that firms are involving in the activity of ESG which transfers their willingness to complete the shareholders' demand and avert the attached costs of strict compliance with formal contractual agreements and these costs are in the form of increasing government regulations and union contracts.

Also, Russo & Fouts (1997) mention that the activities of ESG can be displayed as strategic investments which can help the company to gain a competitive trait by obtaining some skills that is hard to copy. Also, the trade-off shows that ESG activities treat ESG as a possibly inactive use of resource. ESG activities incorporated in capital transfers help increase firm efficiency. This perspective claims that firms' managers should increase the value of the firm and refrain from social responsibility initiatives for the world to be better in the future (Friedman, 1970).

De Masi et al. (2021) state that environmental, social, and corporate governance performance (ESG) has not been discovered to explore how a serious women mass on the board of directors that affect performance in the banking sector. The authors of this paper have tested the impact of a critical women mass directors on environmental, social, and corporate governance performance. In their empirical evidence, authors show that the connection between a bank's ESG performance and females on the board of directors is an inverted U-shape which does not support the theory of critical mass of banks. This confirms that gender balanced boards influence the sustainability of banks. In addition, there is a relationship between the presence of a CSR committee and ESG performance, whereas it is negative with independent shares of directors.

Consequently, empirical literature by Miralles-Quirós et al. (2019) analyzes the connection between investors' credibility and the trust their stakeholders have in them which distinguish

among environmental, social, and corporate governance actions. They conclude that their findings are related to companies' managers, investors, society, and policymakers in general and not only for academics. Tommaso & Thornton (2020) have tested if environmental, social, and governance European scores banks affect the behavior of risk taking and on value of the bank. They find that when ESG scores are high, they will be associated with a simple decrease in risk taking of banks which are low or high-risk takers, and that the effect is restricted on executive board characteristics. They conclude that their finding is consistent with the view of the stakeholders on ESG activities. On the other hand, high environmental, social, and governance scores are related with a decrease in value of banks that consistent with the view of overinvestment of ESG. Also, the reduction in the value of banks happens, even though there is an indirect relationship between bank value through their impact on risk taking and ESG scores. It has been thoroughly researched how ESG variables may impact a company's financial position and valuation. The ensuing results, meanwhile, have not all been agreed upon (Margolis et al., 2009). Early research assumed that social responsibility initiatives or environmental efforts that went above the mandated by basic law requirements will incur added expenses and decrease corporate valuation (Friedman, 2007).

Moreover, Azmi et al. (2021) have examined the connection between the value of banks and the activity of environmental, social, and governance. They apply GMM (Generalized Method of Moments) to address any endogeneity issues. They find that there is a nonlinear relation between the activity of environmental, social, and governance and the value of banks. Their results show low levels in the activity of ESG affect the value of banks positively, however, there are decreasing returns to scale. The friendly environment activity has substantial impact on the value of banks. In addition, they examine the methods where the activity of ESG influences the value of banks and find a link among cash flows, efficiency, and the activity of ESG. On the other hand, their result



indicates that the activity of ESG impacts the equity cost negatively but does not affect the debt cost. ESG practices are thought to have the capability to boost firm valuation, according to the latest research (Fatemi et al., 2018; Malik, 2015). The managerial team's skills and the company's ability to recruit skilled workers, for instance, can be improved through ecologically or socially driven operations under the resource-based perspective of the company. These initiatives can also improve the company's image and relationships with its partners ( Branco & Rodrigues , 2006).

Another study by Fatemi et al. (2018) finds that improving ESG performance can improve financial performance for China's large publicly traded power businesses. The financial performance indicator ROCE corroborates their findings. This empirical evidence has implications for investors, managers, and governments. Additionally, investors can use ESG reports to assess a company's value, risk, and investment potential. In addition, investors can push corporations to improve their ESG performance. Among the many benefits of improving ESG performance are China's enterprises gain global recognition and overcome obstacles.

People care more about non-financial performance, yet less is known about the link between CSR and bank risk. This study by Citterio (2021) aims to fulfill some research gaps by examining the relationship between non- financial performance and bank failure. Authors build a model that predicts a bank's insolvency using ESG-score as a predictor. They study 362 US and EU-28 commercial banks where they examine the association between CSP and bank risk using two well-known risk measures: z-score and MAR (Merton distance-to-default). Next, they aggregate non-financial performances and divide them into three components using many control factors and ESG-score from Thomson Reuters. Citterio (2021) shows that a higher ESG score reduces total risk. Also, they breakdown ESG score into environmental, social, and governance components and show that non-performing loans and profits are the best indicators. In addition,

the study reveals that ESG-scores help model prediction and non-financial performance beat traditional indices. These indices include management efficiency, diversification, and the loan-to-asset ratio. Various empirical studies state that banks should have ESG themes in their business plan. These findings underline the need to share best practices and provide more information to stakeholders and investors about the company's sustainability operations.

In the early 1970s, researchers began looking for a link between ESG and corporate financial performance. Since discovering this relationship, more than 2000 empirical and review studies have been written about it by academics and investors. Findings are difficult to generalize because previous reviews only looked at a small group of observations. As a result, most people are unaware of how ESG factors affect their finances. Consequently, all primary and secondary data from previous academic review studies are used in this study. The study synthesizes the findings of nearly 2200 other studies. Because it examines all of the academic research on this subject, this study can make broad generalizations. The findings demonstrate that ESG investing has a solid business case. Most studies link ESG and CFP, more importantly, most studies find positive relationship between CFP and ESG. A long-term positive effect of ESG on CFP (Friede et al., 2015). Corporate bonds and green real estate are all profitable ESG assets. On the other hand, portfolio studies show a weak relationship between ESG and corporate financial performance. It is important to recognize that the results of these 150 studies are masked by portfolio risks and the costs of setting up mutual funds. To improve future research, we need to understand how ESG criteria interact in financial institutions' stability and which ESG sub-criteria matter for CFP. These findings will help us better understand how environmental, social, and governance (ESG) factors affect a company's success.

To conclude, Environmental, Social, and Governance (ESG) practices are widely believed to possess the inherent potential to significantly elevate the valuation of a firm, as underscored by the most recent scholarly investigations (Fatemi et al., 2018; Malik, 2015). Several research on ESG either positively or negatively correlate it with financial performance and business valuation or produces minimal consequences (Horváthová, 2010; Citterio, 2021). Others argue a typically significant impact, albeit one that is modest and might be waning over the period (Horváthová, 2010; Margolis et al., 2009; Orlitzky et al., 2003). As a result, we form the following hypothesis:

H1: There is relationship between conventional banks' stability and ESG scores.

H2: ESG scores positively affecting Islamic banks' stability.

### **3. Research Design (data, methodology, and variables explanation)**

#### *3.1 Main Model*

Our banking data sample covers the period of 2011-2019. The choice of this specific data period was driven by the discovery of more stable values for the banks in our sample. We use Refinitiv Eikon to collect data for the ESG scores and its pillars as well as ESG controversies. Macroeconomic variables are obtained from the World Bank, and data on bank specific factors comes from Bank Focus. We consider Islamic and conventional banks in the dual banking countries. Hence, we take into account country related variables such as GDP growth, inflation, net interest margin, and unemployment. In addition, we include bank specific variables such as capital, bank size, loan ratio, and liquidity in our regressions. We classify banks based on ESG scores and then compare banks' stability based on the ESG scores.

#### *3.2 Main Model*

We estimate the following typical model of bank stability by:

$$LN-Zscore = \beta_0 + \beta_1 ESG_{ijt} + \beta_2 X_{ijt} + \beta_3 Z_{ijt} + Year_t + Country_t + \varepsilon_{it} \quad (1)$$

where *LN-Zscore* is the natural log of the bank stability variable which is calculated using the following formula:

$$LN - Zscore = \frac{ROA + (Equity\ ratio/Total\ assets)}{\sigma(ROA)}$$

The above equation is a representation of bank stability which consists of return of assets + (equity ratio/total assets)/ 3 rolling periods standard deviation of return on assets (Li et al., 2017). In addition, we use two groups of banks, Islamic and conventional, to test their stability and finally compare the banking stability between these two groups. ESG scores are used as the total or sum of environmental pillar score (ENV) social pillar score (SOC), and governmental pillar score (GOV) which provides an overall rating of the banks' ESG performance. The vector  $X_{ijt}$  contains bank-specific capital, bank size, loan ratio, and liquidity. Moreover, the vector  $Z_{ijt}$  consists of macroeconomic variables such as GDP growth, inflation, unemployment, and net interest margin.

$$LN-Z-score = \beta_0 + \beta_1 ESG_{ijt} + \beta_2 ESGCON_{ijt} + \beta_3 X_{ijt} + \beta_4 Z_{ijt} + Year_t + Country_t + \varepsilon_{it} \quad (2)$$

The second equation has similar vectors, however, we added  $ESGCON_{ijt}$  which represents the controversies score which measures a company's exposure to environmental, social and governance controversies and negative events reported in global media. This equation is used in the subsample comparison tables to distinguish its effects amongst continents.

### 3.3 Variables Explanation

#### 3.3.1 Dependent variable

The main dependent variable is z-score which is a measure of return of assets + (equity ratio/total assets) / each average for rolling time windows of three years of standard deviation of return on assets. Several papers use this variable to measure banks' stability (Lepetit & Strobel, 2013; Li et al., 2020). Also, z-score is identified as the quantity of standard deviations by which a bank's return on asset has to fall for the bank to be declared bankrupt. As a result, z-score is

considered an indicator of bankruptcy and instability risk (Roy, 1952). We use the natural logarithm to reduce skewness of the banks' stability (z-score) and to account for normality of distribution. This helps in explaining and identifying the relationship direction for both positive and negative values (Citterio, 2021).

### *3.3.2 ESG variables*

The main independent variables include ESG total score and ESG controversies score. The ESG activities are used as environmental pillar score, social pillar score, and governmental pillar score. The score provides an overall rating of the banks' ESG performance, and each pillar score measures and contains different content. Environmental pillar, for instance, is weighted sum of the resource use, emission, and environmental innovation. This pillar refers to the regulations and other environmental policy issues in firms, banks, and organizations. The environmental pillar includes ecosystem supervision, wildlife, natural resources safety, and air pollution. The social pillar is the sum of the workforce and human rights and community. The social pillar concentrates on measuring whether the firms are equally treating their workers and employees and being a community friendly member by supporting and helping the neighbors financially and socially. The last pillar is governance pillar score which refers to banks' governance score. This pillar takes the firms or banks' internal operations into consideration as well as their corporate behavior. One of the essential keys of excellent governance is transparency. Contemporary literature has concentrated on the connection between ESG activities and stock prices (La Torre et al., 2020). Giese, Nagy , & Lee (2021) have built a model that used a function for the value of a firm, among other components of the ESG activities and consider a lag between ESG activities and their effect on the evaluations. Basically, the study underlines that stock markets respond more sensitively to ESG factors information for firms that do not apply ESG activities. In addition, the stock markets react strongly to improvements in ESG factors, rather than to drops in ESG activities.

As a result, the lagged ESG is used in this paper to assess the real effect of ESG score on the dependent variable throughout years. The  $ESG_{t-1}$  usually measures the effect of previous investment decisions in ESG activities on current investment decisions. We also want to further investigate the persistence of the lagged ESG score as numerous empirical research has previously shown high persistence level between the lagged ESG and the dependent variable by either analyzing bank performance or efficiency.

### *3.3.3 Control variables*

The control variables that we use in this research are bank specific and macroeconomic variables. Banks specific factors consist of capital, bank size, liquidity, net interest margin, and loan ratio. Our decision to choose capital as a control variable is because capital adequacy is one of the fundamental aspects of a bank's financial stability. It measures the extent to which a bank's capital (equity) can absorb potential losses without jeopardizing its operations. High levels of capital indicate greater resilience to economic downturns and unexpected losses, and it's performed by total equity/total assets. Bank size is a crucial variable because larger banks often have a different risk profile than smaller ones. They may have more diversified portfolios, more resources to weather financial crises, and different regulatory requirements. It helps in assessing the systemic importance of a bank and its potential impact on the financial system which is given by total assets of the bank. Liquidity is essential for a bank's daily operations. Liquidity ratios provide insights into a bank's ability to meet its short-term financial obligations. Studying liquidity can help researchers identify potential vulnerabilities and assess a bank's ability to handle unexpected liquidity shocks and it is calculated by total deposit/total assets. Net interest margin is given by the monetary charge for privilege of borrowing money. It is a key indicator of a bank's profitability. It represents the difference between the interest income earned from loans and investments and the interest expense paid to depositors and other lenders. We use this variable to

gauge how efficiently a bank manages its interest rate risk and earns profits from its core banking operations. The loan ratio, often expressed as loans to total assets or loans to deposits, reflects a bank's lending behavior. It indicates how much of a bank's assets are deployed in the form of loans, which can be indicative of its risk appetite and business strategy. Higher loan ratios may suggest a more aggressive lending strategy and it is calculated by gross loan/ total customer deposit.

The other part of our control variables is macroeconomic characteristics which includes GDP growth that explained by percentage change in GDP, inflation that observes the rate of increase in prices, and lastly the number of unemployed people represented by the unemployment variable. Banking and financial activities are closely tied to the broader macroeconomic environment. GDP, inflation, and unemployment are key macroeconomic indicators that provide context for understanding the economic conditions in which banks operate. Including these variables helps researchers account for the external factors that may influence banks' performance and behavior. In addition, changes in GDP growth, inflation, and unemployment often lead central banks to adjust monetary policy, including interest rates. These changes can have a direct impact on banks' interest income and expenses, influencing their profitability and lending behavior. Researchers use these variables to analyze the effects of monetary policy on banks. These variables and factors control any kind of country impacts and will guarantee that our coefficient outcomes are unbiased. The variable descriptions are provided in Table 1.

[Table 1 about here]

[Table 2 about here]

The initial tables present a compilation of summary statistics pertaining to various variables, including ESG score, ESG controversies (ESGCON), environmental (ENV), social (SOC), governance (GOV), bank-specific factors, and macro variables, focusing on their influence

on the stability of both conventional and Islamic banks. Prior to delving into the empirical findings, (Table 2) provides a concise overview of the variables examined specifically within the context of conventional banks.

Specifically, in terms of the descriptive statistics for ESG performance measures, the average z-score for the banks in our sample is 2.286, indicating a robust financial position on average for the conventional banks included in our analysis. ESG score, with an average value of 42.46, suggests that conventional banks, on average, demonstrate satisfactory performance and strive to achieve a higher level of performance as it approaches the value of 50. Conversely, the score of 91 for ESG controversies implies that, on average, conventional banks have encountered a notable number of controversies or have been involved in high-impact controversies that could potentially have detrimental effects on their reputation, stakeholder trust, and long-term sustainability.

Furthermore, conventional banks exhibit, on average, commendable social and governance performance, although their environmental pillar score is markedly low. When considering the environmental score in conjunction with the ESG controversies score, it becomes evident that banks are falling short of meeting the desired standards or expectations with regards to their environmental practices.

The recorded mean of banks' control variables in the summary statistics show that bank size is 10.57 while it is .1019 for capital and .7711 for liquidity. In addition to that net interest margin has recorded a mean of 3.045 and .6560 for loan ratio. The macro variables in the study recorded mean of 2.743 for GDP growth, 2.072 for inflation, and 5.120 for unemployment respectively. In addition, the standard deviation for ESG scores ranges from 29.10 to 21.77 while for the macroeconomic control variables are from .329 to 3.552.

[Table 3 about here]



[Table 4 about here]

On the contrary, Table 4 provides a comprehensive overview of the variables examined in the context of Islamic banks. The table presents summary statistics based on a sample of 134 observations, focusing on ESG performance measures.

The mean value for bank stability is reported as 2.507, indicating a favorable level of financial health for Islamic banks, surpassing even the conventional banks. This robust financial position is reflective of the inherent characteristics of Islamic funding models, which are participatory in nature. However, it is important to note that such models can potentially introduce higher operational risks, thereby necessitating stringent monitoring and governance practices to ensure stability and mitigate potential risks.

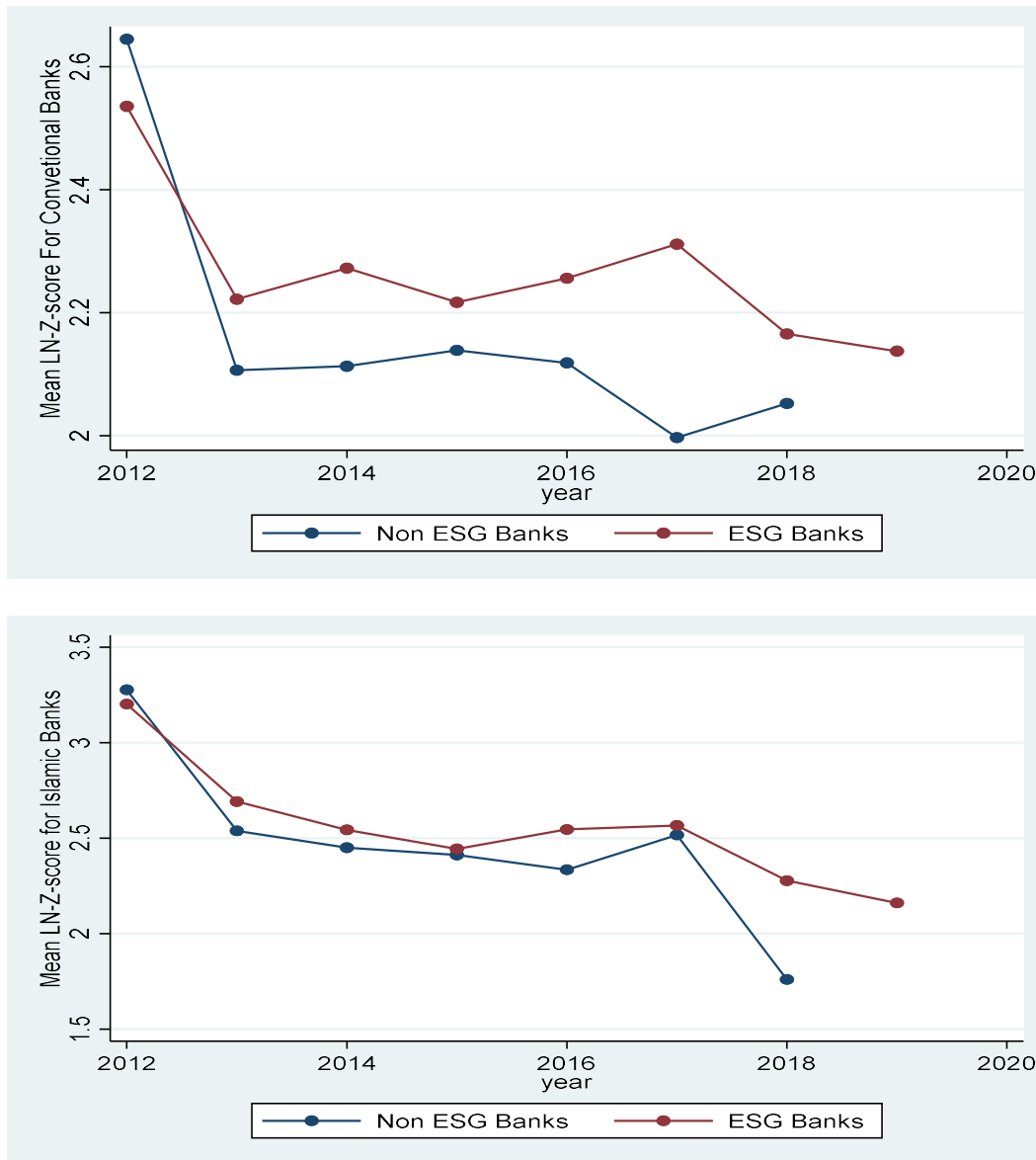
In terms of overall ESG performance, Islamic banks exhibit a satisfactory level of sustainability. Social performance is also deemed satisfactory, while governance performance is characterized as good. This finding is expected, considering the participatory nature of Islamic banks, which emphasizes the importance of strong governance frameworks to maintain transparency and accountability.

However, it is concerning that the environmental score for Islamic banks is notably low. Simultaneously, the ESG controversies score hovers around 98, indicating a considerable lack of compliance or disclosure concerning environmental practices among Islamic banks. This observation suggests that Islamic banks are currently falling short in meeting the desired standards for environmental sustainability or adequately disclosing their environmental activities.

In addition, the mean has various numbers for the control variables such as 10.43 for bank size, .1187 for capital, .8043 for liquidity, 2.447 net interest margin, .6364 for loan ratio, 3.001 for GDP growth, 2.316 for inflation, and 3.664 for unemployment. Moreover, the standard deviation ranges

from 21.19 to 11.11 for ESG variables, and .0272 to 3.253 for macroeconomic and banks' control variables.

**Figure 1: Mean of LN-Z-score for ESG banks and non-ESG banks Conventional vs. Islamic.** Source: Author's using Bank Focus data.



The above diagram (Figure1) displays the volatility of financial institutions that use ESG activities compared to financial institutions that do not. The figure shows that the dependent variable volatility does not sway for banks which use ESG activities as much as its counterpart. In addition,

it is obvious that conventional banks who use ESG performance are more stable than the others (Diaye et al., 2022; Miralles-Quirós et al., 2019; Velte, 2017). However, there appears to be no significant difference between banks who invest in ESG or not in the Islamic segment.

**Figure 2: Thomson Reuters' ESG-score composition.**



[Table 5 about here]

[Table 6 about here]

#### 4. Empirical Results and Discussion

Estimates of the main research equation are reported in (Table 7) by using the pooled estimator and fixed effect regression. The results reported in all columns strongly support the view that the lagged ESG scores are enhancing the conventional bank stability, that is, they support our first hypothesis, H1, and ESG are significant at all levels of significance 1, 5 and 10 percent. Our main independent variable ESG score shows a significant positive effect on the bank stability for conventional bank with a score .00367 at 5% significance level in the first model when regresses it with our dependent variable z-score of the pooled estimator. This positive relationship persists even after including banks and macroeconomics' control variables in the regressions which display .00585 and .00568 at 1% significance level in the other two models. This means that ESG

performance as a whole has a positive effect on the conventional banks' activities, performance and supported by banks' principles and shareholders. As a confirmation of the result, the first model of the fixed effect regression shows that ESG is positive and highly significant of .01299 at 1% significance level. Our findings closely coincide with the conclusions of Harjoto & Laksmana (2018), indicating that ESG factors have a noteworthy effect on the valuation of companies and financial institutions, ultimately contributing to the stability of banks.

The second column in the fixed effect outcomes, we add banks specific factors in the regression. Once again, we find that our main independent variable is positively affecting the z-score. In addition, the bank size (measured as natural logarithm of total assets and natural logarithm of deposits) in column 2 and 3 in the fixed effect regression models shows negative significant correlation and has an effect on bank stability with -.5974 and -.5073 at 1% significance level respectively. This indicates that larger banks are less stable than smaller banks. Therefore, we argue that the relationship between size and stability is inconclusive in the first segment of the research. These findings are consistent with previous literature (Adusei & Elliott, 2015). Furthermore, capital ratio is significantly negatively correlated to bank size which indicates that more credit exposure makes the financial institution more vulnerable to instability and risk. Also, GDP growth is positively correlated to z-score with .0657 at ten level. Our result is similar to the findings of Diaye et al. (2022), which studies OECD nations from 1996 to 2014 and identifies that a favorable correlation in the extended term between ESG factors and GDP per capita and Morgenstern et al (2022) whose findings suggest a positive link between higher ESG scores and increased GDP growth. Inflation is unexpectedly having a negative effect on bank stability at the 10 percent level. This can occur as unexpected growths in inflation cause cash-flow challenges for

borrowers which results in sudden abrogation of loan arrangements with additional loan losses (Adusei & Elliott, 2015).

<b>Variables</b>	Baseline			Fixed		
<b>LN-z-score</b>	(1)	(2)	(3)	(1)	(2)	(3)
<b>ESG<sub>t-1</sub></b>	<b>0.00367*</b> * <b>(0.016)</b>	<b>0.0058**</b> * <b>(0.002)</b>	<b>0.0056**</b> * <b>(0.003)</b>	<b>0.0129**</b> * <b>(0.002)</b>	<b>0.0130**</b> * <b>(0.002)</b>	<b>0.0129**</b> * <b>(0.002)</b>
SIZE		0.031103 (0.248)	0.04864* (0.063)		-0.597*** (0.001)	-0.507*** (0.008)
CAPITAL		4.5362** * (0.00)	3.4128** * (0.002)		-8.777*** (0.004)	-9.365*** (0.002)
LIQUIDITY		1.0360** * (0.000)	.91425** * (0.001)		-0.6141 (0.452)	-.4145 (0.616)
NIM		-0.070*** (0.000)	-0.061*** (0.000)		-0.01257 (0.856)	-0.03188 (0.645)
LR		0.7173** * (0.003)	0.6579** * (0.007)		1.0727 (0.213)	1.1266 (0.197)
GDPG			0.0657** * (0.000)			-0.0486* (0.057)
INFLATION			-0.01988 (0.266)			0.0407* (0.076)
UNEMPLOYMENT			0.0145* (0.088)			0.0472 (0.213)
Constant	51.3548* (0.000)	81.441** * (0.008)	.017255 (0.972)	100.76** * (0.000)	29.517 (0.426)	19.289 (0.623)
Obs.	1,559	1,559	1,559	1,559	1,559	1,559
R <sup>2</sup>	0.0116	0.0410	0.0391	0.0093	0.0024	0.0023
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes

Country dummies    Yes                    Yes                    Yes                    No                    No                    No

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In this table, dependent variable in both stages' regressions are LN-Z-score. Our main independent variable is lagged ESG. We tested  $ESG_{t-1}$  in two different estimators pooled and fixed effects. Our models are as follows; M (1) regresses the dependent variable with  $ESG_{t-1}$  plus country and year effect. M (2) regresses  $ESG_{t-1}$  with banks' specific factors. M (3) regresses  $ESG_{t-1}$  with both banks and macroeconomic variables. The Significance levels are denoted by \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

We perform similar analysis for Islamic banks in (Table 8). We regress our dependent z-score with ESG score again through two different estimators pooled and fixed. The result shows that ESG in the baseline regression does not have any significant outcomes and is not correlated to bank stability. However, in the fixed ordinary least squares regression ESG in the second and third models we find a positive and significant correlation between ESG and z-score (.01822 and .01747 at ten percent level). Surprisingly, the second and third models also in the Islamic sample present positive and highly significant correlation to bank stability in net interest margin of the control variables. In addition, the loan ratio also is significant and positively correlated to z-score at one percent level which interprets to how the bank is able to attract and retain customer and also helps measuring probable loan losses and default. This indicates that ESG can help banks to attract and retain customers which aligns with Liu et al. (2023), who indicated that a unit increase in ESG score can decrease a bank's loan ratio.

	Baseline			Fixed		
LN-z-score	(1)	(2)	(3)	(1)	(2)	(3)
$ESG_{t-1}$	<b>0.0032</b> <b>(0.529)</b>	<b>-0.0007</b> <b>(0.910)</b>	<b>0.0025</b> <b>(0.659)</b>	<b>0.0150</b> <b>(0.112)</b>	<b>0.0182*</b> <b>(0.055)</b>	<b>0.0174*</b> <b>(0.069)</b>
SIZE		0.2398** (0.022)	0.2632** (0.013)		0.8312 (0.363)	0.7051 (0.464)
CAPITAL		0.2220 (0.946)	5.3254 (0.264)		8.0397 (0.444)	3.6466 (0.735)
LIQUIDITY		1.8475 (0.318)	2.3002 (0.230)		-2.2462 (0.629)	-2.1541 (0.646)

NIM		0.2238*	0.1305		1.0234**	0.9215**
		(0.057)	(0.362)		*(0.007)	(0.020)
LR		5.7803	6.0829**		5.7141*	5.6386*
		***	*		(0.079)	(0.086)
		(0.000)	(0.000)			
GDPG			-0.0018			-0.0214
			(0.966)			(0.607)
INFLATION			0.1087			0.0807
			(0.037)			(0.195)
UNEMPLOYME NT			-0.0448			-0.1025
			(0.190)			(0.452)
Constant	43.440	-55.627	-55.812	35.629	130.66	62.423
	(0.643)	(0.532)	(0.548)	(0.719)	(0.321)	(0.665)
Obs.	134	134	134	134	134	134
R <sup>2</sup>	0.0464	0.3379	0.3666	0.0049	0.0648	0.0744
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	No	No	No

Dependent variables in both stages of our regressions are LN-Z-score. Our main independent variable is lagged ESG. We test  $ESG_{t-1}$  in two different estimators pooled and fixed effects. Our models are as follows; M (1) regresses the dependent variable with  $ESG_{t-1}$  plus country and year effect. M (2) regresses  $ESG_{t-1}$  with banks' specific factors. M (3) regresses  $ESG_{t-1}$  with both banks and macroeconomic variables. The significance levels are denoted by \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

In Table 9, we lag and regress each of the three pillars individually with both banks and macroeconomics variables.  $E_{t-1}$  represents the results for environmental pillar,  $S_{t-1}$  represents the result for social pillar, and  $G_{t-1}$  represents the result for governance pillar on the z-score dependent variable. The first lagged  $E_{t-1}$  pillar displays positive and significant outcomes of .00579 at the 5 percent level. This positive correlation to bank stability indicates that conventional banks use environmentally friendly activities such as paperless options, renewable resources, and more sustainable materials and those activities will positively reflect on the bank stability. Nevertheless, lagged social pillar  $S_{t-1}$  is positively correlated to z-score .01052 at one percent which is a higher significant level than lagged environmental pillar. This means that banks are effectively working towards community services, social responsibility, and other social pillar factors. This indication

was also reported by Muhamad et al. (2022) who exhibited that Islamic finance shares core principles with sustainable finance, encompassing aspects related to financial stability, economic growth, poverty alleviation, equitable wealth distribution, and inclusive financial and social participation. The positive correlation indicates that embracing social responsibility enhances and boosts profitability which ultimately leads to banks' stability. However, the bank size in the three different models is negative and significant at 5% level. In addition, the capital variable displays highly significant at one percent level, but negative correlation to bank stability. This could be because shareholders consider investing in ESG activities to be a waste of capital allocation and can badly affect their dividends and payoffs. Moreover, GDP growth is negatively affecting the bank stability throughout all three pillars at ten and five percent levels respectively. A possible explanation for the negative coefficient can be linked to fiscal and monetary policy specifically in developed economies. In such economies, the central banks are more directed by effort to lower inflation rate and stabilize exchange rate rather than maximizing output of the country (Chiaromonte et al., 2022; Alam et al., 2022).

<b>Table 9: Conventional Segment</b>			
<b>LN-z-score</b>	<b>E</b>	<b>S</b>	<b>G</b>
<b>E<sub>t-1</sub></b>	<b>0.0057**</b> <b>(0.030)</b>		
<b>S<sub>t-1</sub></b>		<b>0.0105***</b> <b>(0.003)</b>	
<b>G<sub>t-1</sub></b>			<b>0.0031</b> <b>(0.173)</b>
SIZE	-0.4886** (0.011)	-0.4930** (0.010)	-0.4975** (0.010)
CAPITAL	-9.434*** (0.002)	-9.6745*** (0.002)	-9.4460*** (0.002)
LIQUIDITY	-0.361 (0.662)	-0.5701 (0.491)	-0.3775 (0.649)
NIM	-0.0365 (0.598)	-0.0347 (0.616)	-0.0360 (0.604)
LR	1.1221 (0.200)	1.2167 (0.164)	1.1139 (0.204)



GDPG	-0.0498*	-0.0513**	-0.0525**
	(0.054)	(0.045)	(0.040)
INFLATION	0.0408*	0.0408*	0.0368
	(0.077)	(0.076)	(0.110)
UNEMPLOYMENT	0.0354	0.0368	0.0492
	(0.353)	(0.331)	(0.200)
<hr/>			
Constant	-0.9590	26.275	-26.691
	(0.980)	(0.516)	(0.460)
Obs.	1,559	1,559	1,559
R <sup>2</sup>	0.0039	0.0036	0.4685
Year dummies	Yes	Yes	Yes
Country dummies	No	No	No

It reports the relationship between bank stability and ESG pillar-wise performance. Our independent variables in this table are lagged environmental pillar score ( $ENV_{t-1}$ ), lagged social pillar score ( $SOC_{t-1}$ ), and lagged governance pillar score ( $GOV_{t-1}$ ). We regress each of the three pillars individually with both bank and macroeconomics variables. E presents the results for ( $ENV_{t-1}$ ), S presents the result for ( $SOC_{t-1}$ ), and G presents the result for ( $GOV_{t-1}$ ). Time fixed effect is used in this regression. The significance levels are denoted by \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

In Table 10, we regress each pillar (E, S, and G) individually with both banks and macroeconomic variables for Islamic segment. The lagged pillar  $E_{t-1}$  does not show any significant outcomes related to z-score. Also, this result is similar to the findings of Alam et al., (2022), who argue that Islamic banks are significantly falling behind when compared to conventional banks, indicating a clear area within ESG where Islamic banks must make significant improvements. The second model which includes social pillar  $S_{t-1}$  has shown positive and significant correlation to bank stability. This social pillar score includes human rights, labor, and community services. Such events will positively impact the banks' stability as long as banks are being proactive member to their neighbors and serve communities. Lastly, governance pillar does not display significant correlation to our dependent variable. Other control variables do not show any significant correlation to z-score except net interest margin amongst the three models at five percent

significant level as well as loan ratio which indicates two significant relations towards bank stability in environmental and governance pillars.

<b>Table 10: Islamic segment</b>			
<b>LN-Z-score</b>	<b>E</b>	<b>S</b>	<b>G</b>
<b>E<sub>t-1</sub></b>	<b>0.0032</b> <b>(0.669)</b>		
<b>S<sub>t-1</sub></b>		<b>0.0185**</b> <b>(0.018)</b>	
<b>G<sub>t-1</sub></b>			<b>0.0035</b> <b>(0.575)</b>
SIZE	0.7711 (0.431)	0.4847 (0.613)	0.8052 (0.412)
CAPITAL	4.4589 (0.684)	6.7051 (0.530)	3.6514 (0.742)
LIQUIDITY	-0.6363 (0.894)	-1.5770 (0.729)	-0.6934 (0.884)
NIM	0.9120** (0.024)	1.0062** (0.011)	0.8916** (0.027)
LR	5.9541* (0.074)	4.4572 (0.176)	6.2594* (0.062)
GDPG	-0.0247 (0.561)	-0.0188 (0.649)	-0.0239 (0.240)
INFLATION	0.0767 (0.228)	0.0797 (0.195)	0.07424 (0.240)
UNEMPLOYMENT	-0.1337 (0.331)	-0.1034 (0.440)	-0.1282 (0.353)
Constant	-30.264 (0.836)	71.590 (0.604)	-37.747 (0.781)
Obs.	134	134	183
R <sup>2</sup>	0.0806	0.0636	0.0813
Year dummies	Yes	Yes	Yes
Country dummies	No	No	No

It reports the relationship between bank stability and ESG pillar-wise performance. Our independent variables in this table are lagged environmental pillar score (ENV<sub>t-1</sub>), lagged social pillar score (SOC<sub>t-1</sub>), and lagged governance pillar score (GOV<sub>t-1</sub>). We regress each of the three pillars individually with both bank and macroeconomics variables. E presents the results for (ENV<sub>t-1</sub>), S presents the result for (SOC<sub>t-1</sub>), and G presents the result for (GOV<sub>t-1</sub>). Time fixed effect is used in this regression. The significance levels are denoted by \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

In Table 11, we exhibited the subsample that consists of all five continents in conventional segment. We add ESGCONT in the second equation in addition to the subsamples from continents for both Islamic and conventional banks. We find that the ESG lagged score in Americas and Europe have highly significant outcomes of .02024 and .05216 respectively, which illustrates that  $ESG_{t-1}$  in these two continents has a positive relationship between the stability of banks and ESG performance. These findings are corroborated by previous researchers (Lisin et al., 2022). However, ESG controversies score (ESGCONT) surprisingly appear to be significant and has positive relationship to bank stability at 10% level .00685 in Asian banks. On the other hand, ESG controversies factor in African continent display a negative coefficient of -.0138 at five percent level which tell us that scandals and bad news in Africa hold a sharply negative effect in banks' stability. Another reason for our main independent variable ESG not to show any significant outcome can derive from the fact that most of the African countries are undeveloped and might concentrate more on enhancing the financial and banking system rather than investing on ESG activities. Furthermore, we find the bank specific characteristics such as capital and bank size to be moderately significant between five and ten percent level, but negatively related to our dependent variable.

**Table 11: Subsample of Conventional banks from all five continents**

<b>LN-z-score</b>	<b>Asia</b>	<b>Americas</b>	<b>Europe</b>	<b>Oceania</b>	<b>Africa</b>
ESG <sub>t-1</sub>	-0.0040 (0.628)	0.0202*** (0.002)	0.0521*** (0.006)	-0.0346 (0.593)	-0.0223 (0.387)
ESGCON	0.0068* (0.071)	0.0019 (0.492)	0.0020 (0.643)	0.00796 (0.442)	-0.013** (0.030)
BANK SIZE	-0.6389 (0.330)	-0.5305* (0.088)	0.6533 (0.450)	0.0670 (0.990)	-4.447** (0.043)
CAPITAL	-15.700* (0.073)	-17.231*** (0.001)	50.773*** (0.000)	-101.22 (0.316)	-92.644 (0.030)

LIQUIDITY	-2.2272 (0.275)	1.4228 (0.414)	1.6171 (0.589)	-16.949 (0.191)	-8.0157 (0.125)
NIM	0.1761 (0.443)	0.0102 (0.917)	-0.6408** (0.043)	3.5791 (0.212)	-0.49607 (0.663)
LR	4.1477* (0.095)	1.4829 (0.304)	-2.8173 (0.158)	-0.95508 (0.926)	8.1746 (0.147)
GDPG	-0.09401** (0.042)	-0.06532 (0.153)	0.12172 (0.260)	1.9760** (0.032)	0.64507 (0.113)
INFLATION	0.1484*** (0.005)	-0.06431 (0.188)	-0.07249 (0.197)	1.0288 (0.152)	0.1005 (0.559)
UNEMP	-0.0698 (0.634)	0.1025 (0.127)	0.0739 (0.713)	14.384** (0.011)	0.1659 (0.712)
Constant	-202.01* (0.081)	151.82** (0.034)	-183.08 (0.353)	-385.21 (0.334)	-179.41 (0.757)
Obs.	480	873	129	45	32
R <sup>2</sup>	0.0066	0.0132	0.0010	0.0040	0.3256
Year dummies	Yes	Yes	Yes	Yes	Yes
Country dummies	No	No	No	No	No

This table reports subsample of Conventional banks from all five continents (Asia, Americas, Europe, Oceania, and Africa). Our dependent variable remains the same LN-Z-score. We add ESG Controversies as an independent variable to the model. We regress  $ESG_{t-1}$  and ESGCON with LN-Z-score plus the banks and macroeconomic as control factors. The significance levels are denoted by \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 12 reports a subsample of Islamic segment and contains observations only from Asia due to lack of observation from African continent. The results are consistent with our previous findings as the main independent variable, lagged ESG, has a positive effect on stabilizing banks. Additionally, other control factors, such as, net interest margin and loan ratio positively influence bank stability. This finding is similar to Liu et al., (2023), who demonstrates that a bank's positive ESG performance enhances the quality of its loans, underscoring the significance of all three aspects of ESG. Main takeaway is that ESG of Islamic banks in Asia is positively related to bank stability unlike conventional segment in Table 9.

**Table 12: Subsample of Islamic banks from Asia**

LN-Z-score	Asia
ESG	<b>0.0165*</b> <b>(0.091)</b>
ESGCON	-0.0034 (0.707)
CAPITAL	3.7659 (0.731)
BANK SIZE	1.0019 (0.322)
LIQUIDITY	-2.2888 (0.631)
NIM	0.9466 ** (0.019)
LR	5.4848* (0.0)98
GDPG	-0.0155 (0.716)
INFLATION	0.0885 (0.169)
UNEMP	-0.0873 (0.542)
Constant	56.642 (0.699)
Obs.	130
R <sup>2</sup>	0.0698
Year dummies	Yes
Country dummies	No

This table reports subsample from Asia. Our dependent variable remains the same LN-Z-score. We add ESG Controversies as an independent variable to the model. We regress ESG<sub>t-1</sub> and ESGCON with LN-Z-score plus the bank and macroeconomic variables as control factors. The significance levels are denoted by \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

In Table 13, we perform a two-step GMM system to check the robustness of earlier regressions and models in order to assess the reliability of our results from previous findings on the impact of ESG on the persistence of banks stability for conventional segment. We use ESG, lagged environmental pillar, lagged social pillar, and lagged governance pillar. We demonstrate two models for each variable and pillar. First, we regress ESG in model one without any control characteristics on our z-score, then we regress the variable after including all control factors in the second model. In addition, we regress each pillar with and without the control characteristics as it appears in Table 11 by model (1) and (2). The results indicate that our previous regressions throughout different models are robust and mirror similar outcomes. The findings remain

consistent after including Sargan, Hansen, AR (1), and AR (2) as well as the number of groups and instruments. The results of Arellano-Bond test (1) in first differences are less than the rest of other tests which confirms our regression results as the number of groups are greater than the number of instruments (Arellano & Bond, 1991).

<b>Table 13</b>		<b>GMM-CONVENTIONAL</b>							
<b>LN-z-score</b>	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	
<b>ESG<sub>t-1</sub></b>	<b>0.0068***</b> <b>(0.002)</b>	<b>0.0055*</b> <b>(0.003)</b>							
<b>E<sub>t-1</sub></b>			<b>0.0039***</b> <b>(0.003)</b>	<b>0.0034**</b> <b>(0.048)</b>					
<b>S<sub>t-1</sub></b>					<b>0.0044**</b> <b>(0.011)</b>	<b>0.0024</b> <b>(0.276)</b>			
<b>G<sub>t-1</sub></b>							<b>0.0044**</b> <b>(0.024)</b>	<b>0.0032</b> <b>(0.111)</b>	
SIZE		0.0869** (0.026)		0.0864** (0.022)		0.1115*** (0.003)		0.1125*** (0.002)	
CAPITAL		3.0066* (0.078)		3.3627* (0.053)		3.2310* (0.065)		2.9282* (0.091)	
LIQUIDITY		0.4162 (0.335)		0.3400 (0.411)		0.3707 (0.404)		0.3765 (0.377)	
NIM		-0.0473* (0.054)		-0.0493* (0.057)		-0.0471* (0.067)		-0.0481* (0.063)	
LR		0.9576** (0.011)		1.0094** (0.008)		0.9973*** (0.009)		0.9855** (0.011)	
GDPG		0.0037 (0.874)		0.0044 (0.874)		0.0009 (0.970)		0.0033 (0.884)	
INFLATION		-0.0170 (0.528)		-0.0176 (0.526)		-0.0196 (0.476)		-0.0151 (0.571)	
UNEMP		0.0105 (0.238)		0.0084 (0.374)		0.0110 (0.228)		0.0149* (0.096)	
Sargan	0.129	0.154	0.117	0.151	0.104	0.128	0.077	0.109	
Hansen	0.087	0.121	0.089	0.134	0.086	0.119	0.056	0.089	
AR (1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
AR (2)	0.737	0.707	0.723	0.692	0.736	0.703	0.820	0.751	
Obs.	885	885	885	885	885	885	885	885	
G/I	282/9	282/17	282/9	282/17	282/9	282/17	282/9	282/17	

The Hansen (1982) test assesses the p values for the hypothesis that the instruments employed are uncorrelated with the error term. Similarly, the Arellano and Bond (1991) test examines the p values

for the hypothesis that the errors in the first difference regression do not display second-order serial correlation. The Significance levels are denoted by \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

In Table 14, we perform a two-step GMM system to check robustness of earlier regressions and models to see the impact of ESG on the persistence of banks stability for Islamic banks. Similarly, we use ESG, lagged environmental pillar, lagged social pillar, and lagged governance pillar and regress them with the natural log of z-score. We regress ESG in model (1) without any control variables on our z-score, then we regress the same variable with all control factors in model (2). Furthermore, we regress lagged environmental pillar with and without the control characteristics as well as lagged social, and governance pillar. The results imply that our prior regressions all through models are robust, hence, we derive similar conclusions. Once again, this is confirmed by looking into Sargan, Hansen, AR (1), and AR (2) as well as the number of groups and instruments (Arellano & Bond, 1991). As per stakeholder theory, a mutually beneficial connection exists between corporations and their stakeholders. To enhance the value of a company, these firms should actively participate in endeavors that contribute to the betterment of their external surroundings. In doing so, they concurrently enhance the environment for their stakeholders, ultimately resulting in value appreciation for the firms. This principle applies equally to both conventional and Islamic banks, where Environmental, Social, and Governance (ESG) initiatives have the potential to exert a positive influence on the external ecosystem and substantially affect the internal workings of banks. This, in turn, leads to enhanced bank valuations and an improved state of stability (Freeman, 2010).

<b>Table 14</b>	<b>GMM-ISLAMIC</b>							
<b>LN-z-score</b>	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
<b>ESG<sub>t-1</sub></b>	<b>0.0019</b>	<b>0.0057</b>						
	<b>(0.774)</b>	<b>(0.540)</b>						
<b>E<sub>t-1</sub></b>			<b>-0.0003</b>	<b>0.0043</b>				
			<b>(0.922)</b>	<b>(0.459)</b>				
<b>S<sub>t-1</sub></b>					<b>0.0039</b>	<b>0.0046</b>		
					<b>(0.395)</b>	<b>(0.551)</b>		

<b>G<sub>t-1</sub></b>						<b>-0.0026</b>	<b>0.0012</b>	
						<b>(0.709)</b>	<b>(0.893)</b>	
SIZE			0.1126	0.1375			0.1491	
			(0.280)	(0.208)			(0.220)	
CAPITAL	6.8966	6.5887	8.3457	6.8353				
	(0.330)	(0.339)	(0.235)	(0.446)				
LIQUIDITY	2.7785	2.3569	2.6796	2.8753				
	(0.422)	(0.503)	(0.440)	(0.415)				
NIM	0.0747	0.0547	0.0746	0.0656				
	(0.674)	(0.738)	(0.673)	(0.701)				
LR	4.7008***	4.5114***	4.4447***	4.7697**				
	(0.001)	(0.000)	(0.000)	(0.018)				
GDPG	0.0164	0.0151	0.0222	0.0197				
	(0.675)	(0.660)	(0.572)	(0.669)				
INFLATION	0.1683	0.1752**	0.1680**	0.1611**				
	(0.035)	(0.050)	(0.039)	(0.039)				
UNEMP	0.0049	-0.0021	-0.0042	0.0107				
	(0.803)	(0.932)	(0.872)	(0.827)				
Sargan	0.564	0.768	0.577	0.785	0.564	0.759	0.652	0.794
Hansen	0.523	0.677	0.515	0.682	0.539	0.683	0.528	0.650
AR (1)	0.016	0.019	0.014	0.018	0.017	0.018	0.017	0.018
AR (2)	0.145	0.106	0.141	0.106	0.160	0.109	0.156	0.081
Obs.	82	82	82	82	82	82	82	82
G/I	22/9	22/17	22/9	22/17	22/9	22/17	22/9	22/17

The Hansen (1982) test assesses the p values for the hypothesis that the instruments employed are uncorrelated with the error term. Similarly, the Arellano and Bond (1991) test examines the p values for the hypothesis that the errors in the first difference regression do not display second-order serial correlation. The Significance levels are denoted by \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

## 5. Summary and Conclusion

Existing literature in the field of sustainability has explored the connection between ESG (Environmental, Social, and Governance) factors and bank stability and identified a non-linear relationship between the two, as evidenced by Alam et al. (2022). However, only a limited number of studies have ventured to differentiate between Islamic and conventional banks before delving into the analysis of how ESG factors affect the operational dynamics and stability of banks, as



highlighted by Chiaramonte et al. (2022). Our research seeks to bridge this existing gap by conducting a comprehensive investigation into the impact of ESG on bank stabilities. We aim to distinguish the effects of ESG factors on both conventional and Islamic banks across all five continents.

In this study, we aim to assess the stability of banks by employing the z-score as a dependent variable, with a primary focus on ESG (Environmental, Social, and Governance) principles as the main independent variable. We employ various measurement methods, including baseline and fixed-effect regression, as well as Generalized Method of Moments (GMM) to ensure the robustness of our findings. These methods are applied across different models for both Islamic and conventional banking sectors.

Our empirical results reveal a noteworthy and positive impact of ESG activities on the stability of banks, encompassing both conventional and Islamic financial institutions. Specifically, our findings highlight that ESG score have a significant positive influence on the stability of both conventional and Islamic banks, underscoring the potential of ESG performance to enhance their overall stability.

In a more detailed analysis, it becomes evident that variables related to the environmental and social pillars exhibit particularly strong and statistically significant outcomes for conventional banks. This suggests that engaging in socially and environmentally responsible activities can have a notably positive effect on the operational activities of conventional banks, ultimately contributing to the enhancement of their overall stability. Conversely, our findings unveil a distinct pattern for Islamic banks. They demonstrate a significantly positive effect of the social pillar score on the stability of these banks. This indicates that the active engagement of Islamic banks in areas related to human rights, labor practices, and community service can have a positive influence on the

stability of these financial institutions. Furthermore, our analysis delves into ESG controversies and their impact on the African continent. Here, we observe a negative coefficient, which aligns with expectations. This suggests that historical or ongoing scandals, adverse news, and financial crises within these regions tend to exert an adverse effect on the stability of banks operating in African countries.

In conclusion, our most significant contribution lies in highlighting the pivotal role of ESG principles for both conventional and Islamic financial institutions. Our findings underscore the advantages of incorporating all three ESG pillars into the decision-making processes, as this stands to enhance the stability of both types of financial institutions. Despite the distinct legal frameworks that govern Islamic and conventional banks, our research demonstrates that ESG activities have a direct and meaningful impact on both, further emphasizing the universal relevance of ESG considerations in the financial sector.

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## Appendix

**Table 1 variables description**

<b>Name of Variable</b>	<b>Definition</b>	<b>Notation</b>	<b>Source</b>
Bank Stability	Return on assets plus the capital asset ratio divided by the standard deviation of asset.	LN-Z-SCORE	Bank Focus
ESG Activities	An overall company score based on the reported information in the environmental, social and corporate governance pillars.	ESG	Refinitiv Eikon
ESG Controversies	Measures a company's exposure to environmental, social and governance controversies and negative events reflected in global media.	ESGCON	Refinitiv Eikon
Environment Pillar	weighted sum of the Resource use, Emission and Environmental innovation.	E	Refinitiv Eikon
Social Pillar	Sum of the workforce and human rights and community.	S	Refinitiv Eikon
Governance Pillar	Bank governance score.	G	Refinitiv Eikon
Control Variables			
Bank Specific Variables			
Capital	Total equity/total assets	CAPITAL	Bank Focus
Bank Size	Total assets of the bank.	BANK SIZE	Bank Focus
Liquidity	Total deposit/total assets	LIQUIDITY	Bank Focus
Net Interest Margin	The monetary charge for privilege of borrowing money.	NIM	Bank Focus
Loan Ratio	Gross loan/ Total customer deposit.	LR	Bank Focus
Macroeconomic Variables			
GDP Growth	Percentage change in GDP	GDPG	World Bank
Inflation	The rate of increase in prices.	INFLATION	World Bank
Unemployment	The number of unemployed people.	UNEMP	World Bank

**Table 2: Conventional banks sample**

<b>Variable</b>	<b>Obs.</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
LN-Z-SCORE	1,559	2.286	1.080	-1.812	7.253
ESG	1,559	42.46	19.10	3.538	91.16
ESGCON	1,559	91.54	22.28	.4237	100
E	1,559	22.84	29.10	0	95.54
S	1,559	42.40	21.77	1.293	96.41
G	1,559	50.38	21.83	.4659	99.37
CAPITAL	1,559	.1019	.0329	.0001	.3690
BANK SIZE	1,559	10.57	1.745	6.861	13.69
LIQUIDITY	1,559	.7711	.1179	.0281	.9458
NIM	1,559	3.045	1.778	.5253	33.54
LR	1,559	.6560	.1275	.1606	.9778
GDPG	1,559	2.743	1.792	-4.712	8.256
INFLATION	1,559	2.072	1.686	-1.143	15.53
UNEMP	1,559	5.120	3.552	.1100	28.47

This table is the descriptive statistics which includes all variables that we are using. The first column reports the variables, second column shows the definition of each variable, column three is observation, column four is the mean, column reports the standard deviation, column six shows the minimum, and column seven reports the maximum.



**Table 3 Correlation**

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<b>(1) ESG<sub>t-1</sub></b>	1.000												
<b>(2) ESGCON</b>	-0.407*	1.000											
<b>(3) E<sub>t-1</sub></b>	0.840*	-0.431*	1.000										
<b>(4) S<sub>t-1</sub></b>	0.911*	-0.418*	0.810*	1.000									
<b>(5) G<sub>t-1</sub></b>	0.729*	-0.184*	0.396*	0.409*	1.000								
<b>(6) BANK SIZE</b>	0.638*	-0.436*	0.730*	0.594*	0.344*	1.000							
<b>(7) CAPITAL</b>	-0.307*	0.280*	-0.415*	-0.309*	-0.100*	-0.519*	1.000						
<b>(8) LIQUIDITY</b>	-0.425*	0.295*	-0.411*	-0.412*	-0.248*	-0.449*	0.122*	1.000					
<b>(9) NIM</b>	-0.167*	0.112*	-0.182*	-0.146*	-0.109*	-0.302*	0.501*	0.017	1.000				
<b>(10) LR</b>	-0.257*	0.247*	-0.338*	-0.226*	-0.133*	-0.484*	0.229*	0.202*	0.052	1.000			
<b>(11) GDPG</b>	0.008	-0.001	-0.006	0.029	-0.017	0.210*	-0.133*	-0.075*	-0.030	-0.126*	1.000		
<b>(12) INFLATION</b>	0.022	-0.038	0.035	0.072*	-0.065*	0.013	0.020	-0.136*	0.256*	-0.107*	0.139*	1.000	
<b>(13) UNEMP</b>	0.219*	-0.158*	0.304*	0.287*	-0.024	0.164*	-0.141*	-0.190*	0.038	-0.126*	-0.197*	0.286*	1.000

Correlation matrix for variables of the panel data model (conventional segment)

**Table 4: Islamic bank sample**

<b>Variable</b>	<b>Obs.</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
LN-Z-SCORE	134	2.507	1.004	-1.068	4.888
ESG	134	40.24	16.91	7.003	82.42
ESGCON	134	97.42	11.11	31.50	100.0
E	134	17.59	20.94	0	70.27
S	134	37.98	20.60	3.407	85.71
G	134	52.95	21.19	3.939	93
CAPITAL	134	.1187	.0272	.0658	.1777
BANK SIZE	134	10.43	1.048	8.504	12.46
LIQUIDITY	134	.8043	.0454	.6801	.8807
NIM	134	2.447	.7927	1.262	5.494
LR	134	.6364	.1155	.3066	.8324
GDPG	134	3.001	2.579	-4.712	6.006
INFLATION	134	2.316	2.248	-.8768	10.57
UNEMP	134	3.664	3.253	.1100	16.85

This table is the descriptive statistics which includes all variables that we are using. The first column reports the variables, second column shows the definition of each variable, column three is observation, column four is the mean, column reports the standard deviation, column six shows the minimum, and column seven reports the maximum.

**Table 5 Bank distribution across countries**

<b>Country</b>	<b>N</b>	<b>Country</b>	<b>N</b>
Argentina	45	Liechtenstein	18
Australia	63	Malaysia	72
Austria	27	Mexico	45
Bahrain	9	Netherlands	18
Belgium	9	Nigeria	9
Bermuda	9	Norway	63
Brazil	45	Oman	54
Canada	63	Pakistan	27
Chile	45	Peru	18
China	198	Philippines	18
Colombia	45	Poland	90
Cyprus	9	Portugal	18
Czech Republic	18	Puerto Rico	18
Denmark	45	Qatar	18
Egypt	18	Romania	18
Finland	18	Russia	27
France	27	Saudi Arabia	90
Germany	36	Singapore	27
Greece	27	South Africa	54
Hong Kong	45	South Korea	63
Hungary	9	Spain	63
India	135	Sweden	27
Indonesia	45	Switzerland	54
Ireland	27	Thailand	63
Israel	36	Turkey	72
Italy	117	UAE	63
Japan	198	UK	81
Jordan	9	USA	2,583
Kuwait	54	<b>Total</b>	<b>5,202</b>

In this table, we report the total number of bank-year observations for each country in our sample.

**Table 6 Correlation**

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<b>(1) ESG<sub>t-1</sub></b>	1.000												
<b>(2) ESGCON</b>	-0.242	1.000											
<b>(3) E<sub>t-1</sub></b>	0.816	-0.328*	1.000										
<b>(4) S<sub>t-1</sub></b>	0.887	-0.279*	0.787*	1.000									
<b>(5) G<sub>t-1</sub></b>	0.706	-0.032*	0.361*	0.316*	1.000								
<b>(6) BANK SIZE</b>	0.638	-0.106*	0.572*	0.584*	0.406*	1.000							
<b>(7) CAPITAL</b>	-0.182	-0.281*	0.002	-0.296*	-0.007	-0.398*	1.000						
<b>(8) LIQUIDITY</b>	-0.236	0.074*	-0.186*	-0.186*	-0.200*	-0.106	-0.269*	1.000					
<b>(9) NIM</b>	-0.282	-0.064*	-0.174*	-0.270*	-0.193*	-0.263*	0.203*	0.222*	1.000				
<b>(10) LR</b>	-0.073*	0.202	-0.044	0.053	-0.215*	-0.064*	0.102	-0.211*	-0.459*	1.000			
<b>(11) GDPG</b>	0.229	0.000*	0.144	0.325*	0.015	0.294*	-0.574*	-0.085	-0.351*	0.024	1.000		
<b>(12) INFLATION</b>	-0.198	-0.013*	-0.225*	-0.145	-0.156	-0.084	-0.277*	0.240*	0.552*	-0.546*	0.127	1.000	
<b>(13) UNEMP</b>	0.067	-0.536	0.263*	0.144	-0.149	-0.017	0.255*	0.032	0.403*	-0.441*	0.075	0.378*	1.000

Correlation matrix for variables of the panel data model (Islamic segment)

# **ESG and Market Efficiency: Evidence from Financial Sector**

## **Abstract**

The purpose of this study is to evaluate the market's ability to internalize ESG performance in the banking industry. Using three market indicators - information asymmetry, market risk, and market valuation - as proxies for the market's behavior towards ESG, we investigate whether market indicators exhibit a synchronized response, which implies that ESG is no longer a friction to the banking sector's market efficiency. A global dataset of 1532 banks from the Refinitiv database covering the period from 2013 to 2022 is utilized and a Fixed Effect model is employed with a lagged dependent variable. The results of this study demonstrate that the financial market has begun to recognize the significance of ESG factors as a key driver of bank value, as evidenced by the synchronized response of market indicators to ESG factors. However, our geographical analysis indicates that the level of recognition of ESG performance varies by region. The Oceania and Asian markets, for instance, display an asymmetric response to ESG performance, confirming ESG as a friction to market efficiency while Europe and American capital market exhibited a symmetric response suggesting ESG is no more a myth for these capital markets. The results of our study are robust to alternative proxies of market indicators and estimation techniques, demonstrating their validity.

**JEL classification:** G21, C53, G32, D62, G14.

**Banking Sector, ESG performance, Externalities' Remediation, Market efficiency**

# ESG and Market Efficiency: Evidence from Financial Sector

## Chapter 2

### 1. Introduction

Environmental, social, and governance (ESG) activities in the financial sector are the actions and policies that financial institutions implement to promote sustainability and responsible investing. Among these activities are investing in renewable energy projects, supporting small businesses, and promoting diversity and inclusion in the workplace.

The concept of sustainable investing is a global phenomenon that is also gaining traction in Asian countries, especially Japan and China. Japan's sustainable assets under management reached \$70.4 billion in 2019, a 20% increase from the previous year (Japan Sustainable Investment Forum, 2019). The government in China has promoted sustainable investing through various policies and initiatives, such as the issuance of green bonds and the inclusion of environmentally friendly companies in stock indexes (Hongkong and Shanghai Banking Corporation Co., 2021).

Financial institutions in Europe are also implementing ESG policies and programs. For example, in the UK, the Financial Conduct Authority (FCA) <sup>1</sup> has introduced guidelines for firms on how to integrate ESG considerations into their investment and lending decisions (Financial Conduct Authority, 2020). Many European banks have also set targets for financing renewable energy projects, and some have committed to divesting from fossil fuels (Eurosif, 2019). The

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<sup>1</sup> The Financial Conduct Authority (FCA) is a regulatory body in the United Kingdom that oversees financial markets and firms. Its main goal is to protect consumers and promote competition in the financial markets to ensure that they work well. It was established in 2013, and it took over many of the responsibilities of the Financial Services Authority (FSA).

European Union also has established regulations on sustainable finance and sustainable investment (European Union, 2022).<sup>2</sup>

According to the Canadian Responsible Investment Association report (2022), Canadian investors are well versed in responsible investing (RI), with \$3 trillion in assets under management and 94% incorporating environmental, social, and governance (ESG) considerations into their investment strategy (Responsible Investment Association, 2022). In 2020, sustainable investing assets under management in the United States reached \$17.1 trillion, an increase of 38% from the previous year (US SIF, 2020) In Oceania, the value of Australian responsible investment assets reaches \$1.54 trillion due to aggressive efforts by investment managers to address ESG issues (Responsible Investment Association Australia, 2022) . In addition, the Australian government has introduced policies to encourage sustainable investing, such as tax incentives for renewable energy investments. New Zealand has also been promoting sustainable investing through the New Zealand Superannuation Fund which is now 100% invested in sustainable funds and has divested from companies that are associated with fossil fuels and weapons (The New Zealand Superannuation Fund, 2020).

Considering the above facts, it is obvious that ESG activities are becoming increasingly popular worldwide. A number of financial institutions are implementing policies and programs in order to promote sustainable investing and responsible investing. Various government policies and regulations are being introduced to promote sustainable finance and investing. The financial sector still requires a significant amount of work to fully integrate ESG considerations, particularly in terms of data availability and reporting.

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<sup>2</sup> e.g., The Taxonomy Regulation, The Disclosure Regulation, The EU Technical Expert Group (TEG) on Sustainable Finance, The EU's Capital Markets Union (CMU) Action Plan and The EU Action Plan on Sustainable Finance

In manufacturing sector, proponents of sustainability have propagated the concept of true pricing for the internalization of the externalities. The idea of the true pricing is that the cost of externalities should be borne by the producer or the ultimate buyer of the product but not the society at large. Banking sector is not the exception and are taking into account the externalities of their financial products and services. Externalities of the financial sector refer to the costs or benefits of a project or investment that are not reflected in the price of the product or service. For example, The World Bank has implemented a true pricing strategy in their lending operations that accounts for externalities by requiring borrowers to conduct environmental and social assessments before receiving a loan (The World Bank, 2020). Similarly, JPMorgan Chase, the largest US bank, has implemented a true pricing strategy that includes a \$200 billion, five-year commitment to finance clean energy and sustainable infrastructure projects (JPMorgan Chase, 2020).

By considering externalities, banks can ensure that their financial products and services are not causing undue harm to the environment or society. This can help banks to avoid stranded assets, which are assets that may become valueless due to environmental regulation or technological advancements. For example, The Norwegian Government Pension Fund Global has implemented a true pricing strategy that factors in long-term costs and benefits of environmental and social factors by divesting from companies that are associated with fossil fuels and weapons (Skarcke et al., 2014) Furthermore, it is also important for regulatory compliance, as more and more governments are implementing policies and regulations to promote sustainable finance and investing. Banks that are not in compliance with these regulations can face financial penalties and reputational risks. For example, The European Union has established regulations on sustainable finance and sustainable investment and requires financial institutions to disclose their ESG risks and performance (European Union, 2022).



## **1.1 Sustainability-Focused Loan Appraisal Process**

When extending financing to companies in order to ensure sustainability, banks typically have an appraisal process in place to assess the environmental and social risks and opportunities of the projects (e.g. World Bank, 2020). This process includes several steps:

**Project screening:** Bank first screens a project to ensure it aligns with its environmental and social standards and guidelines (e.g. JPMorgan Chase, 2020). The project's environmental and social impacts, as well as its compliance with laws and regulations, must be evaluated.

**Due Diligence:** In order to evaluate the project's environmental and social risks and opportunities, banks conduct an in-depth due diligence process (e.g., International Finance Corporation, 2016). In addition, the company's environmental and social management systems will be assessed, as well as the project's environmental and social impacts.

**Risk Assessment:** Banks assess the risks associated with the project and the company, including the risk of non-compliance with environmental and social standards, the risk of negative impacts on local communities, and the risk of stranded assets (e.g., BlackRock, 2019).

**Impact assessment:** A bank will evaluate a project's potential positive and negative impacts on the environment and society, as well as its potential to contribute to the Sustainable Development Goals (SDGs) of the United Nations (e.g., United Nations, 2015).

**Mitigation and management plan:** Banks develop a plan to mitigate and manage the identified environmental and social risks and to maximize the positive impact of the project (e.g. Global Reporting Initiative, 2016). This includes measures to prevent, mitigate and compensate for negative impacts, and to enhance positive impacts of the project.

**Monitoring and reporting:** During project implementation, banks monitor the project's compliance with environmental and social standards and bank policies (e.g., Equator Principles

Association, 2019). Investors and regulators are also informed about the environmental and social performance of the project by banks.

To conclude, banks conduct an appraisal process when offering financial services to companies to ensure sustainability, which includes screening the project, due diligence, assessing risk, assessing impact, mitigating, and managing the risk (e.g., World Bank, 2020; JPMorgan Chase, 2020; International Finance Corporation, 2016; BlackRock, 2019; United Nations, 2015; Global Reporting Initiative, 2016, Equator Principles Association, 2019). Through this process, banks are able to identify and manage environmental and social risks and opportunities associated with the project, as well as ensure that the project complies with their environmental and social standards and guidelines.

## **1.2 Contribution of the Study**

Empirical literature on sustainability performance of the financial sector highlighted the regulation and corporate governance practices of the banks as key drivers of banks sustainability performances of the banks and we have mentioned above few of them. As a result of these initiatives, the market has begun to remediate the ESG performance of companies, which is contingent upon the market's ability to comprehend and interpret the information disclosed in ESG reporting.

The purpose of this study is to determine whether the market is able to comprehend and interpret the ESG performance of banks and exhibit a response that is consistent with the respective banks' ESG performance. To achieve this aim, we employed three variables as proxies for market response: information asymmetry, risk profile of the bank, and the valuation of the bank.

As a proxy for information asymmetry, we used the standard deviation of the analysts' forecasting (Bernardi & Stark, 2018; Bofinger et al., 2022). This was chosen as analysts are responsible for transmitting information from financial statements to the capital market, and ESG reporting

provides supplementary information beyond financial numbers, which improves the information environment of the company and reduces information asymmetry. As a measure of robustness, we also employed the bid-ask spread as a proxy for information asymmetry (Delisle et al., 2021; Martinez, 2015; Michaels & Grüning, 2017; Sriani & Agustia, 2020). To measure the risk profile of the banks, we used risk density and non-performing loans ratio to total loans as proxies (Di Tommaso & Thornton, 2020; Kishore, 2018; Stefano Manestra, 2013). We posit that reduced information asymmetry will also lead to a reduction in bank risk. The third variable considered in our analysis is the valuation of the bank. We utilized the market price and book value of shares as proxies, as we hold the belief that, due to a reduction in uncertainty and risk, the ESG performance of the bank will enhance its value (Di Tommaso & Thornton, 2020; El Khoury et al., 2021).

We expect to observe a negative coefficient for information asymmetry and risk, and a positive coefficient for the value of the bank when regressed against ESG performance. The rationale for this expectation is that if the market clearly understands and trust what is disclosed in ESG reports and can establish a link between sustainability performance and market performance of the bank the market indicators would exhibit a synchronized behavior. This would suggest that ESG performance can be used as a useful tool for improving the overall performance of banks. Conversely, an asymmetric response would show market confusion and would highlight ESG as a friction to market efficiency.

This study builds upon the work of Bofinger et al. (2022), who examined the relationship between market efficiency and the movement of fair value to market price within the US sector. We expand upon this concept by linking market efficiency to the response of various market indicators. If these indicators exhibit symmetric behavior, it suggests that the market understands and correlates sustainability with the financial performance of banks, supporting the efficient

market hypothesis. If, on the other hand, the indicators show asymmetric behavior, it indicates that the market has either no understanding or confidence in ESG performance. In addition, our study focuses on the financial sector and uses a global dataset to enhance generalizability. By analyzing the market response across regions, we hope to determine whether it is consistent or varies.

This study contributes to the existing literature on sustainable finance by exploring the relationship between sustainability, market efficiency, information asymmetry, and risk valuation within the banking sector. Our findings will also demonstrate the benefits of ESG reporting for banks and suggest it as a valuable tool for enhancing overall performance. The results of this study have important implications for regulators, policymakers, and investors, as they can utilize the information to make more informed investment decisions and promote sustainable banking practices.

The paper is structured such that: Literature review is presented in the second section of this paper, research design is discussed in the third section, results are discussed in the fourth section, and the paper is concluded in the fifth section.

## **2. Literature Review**

### **2.1 ESG Performance of Financial Institutions**

The concept of socially responsible investing refers to the use of a bank's lending activities to achieve social and environmental objectives (Weber et al., 2014). This idea is relevant to our research since it promotes long-term value creation. A lot of people use the terminologies green financing and sustainable investment synonymously (Stojanovic et al., 2019). Financial investments in sustainable development projects and environmental technologies, as well as policies that encourage the development of a sustainably economy, are included in this definition.

The term "green lending" refers to the actual loans that banks make to their customers in the form of green credits (Li & Qian, 2018).

To highlight the existing trend on the market response to ESG performances of the banking sector we did a bibliometric analysis of the literature. To accomplish this, we extracted literature data using the appropriate keywords, such as "ESG", "Environmental Social and Governance", "Sustainability performance" along with "Market Performance", "Financial Performance" "Banks", and searched them in the title, abstract and authors keywords. The integrated literature data are then visualized by keyword analysis (figures 1), as well as a bibliographic coupling analysis (figure 2).

According to the keyword co-occurrence network map (Fig. 1), there are three main clusters: red, green, and blue. Although these clusters are closely associated and have overlapping themes, three study strands can be identified, which correspond to the three dimensions of performance, namely, Banking sustainability performance and financial performance of banking sector (red), Sustainable banking: the role of corporate governance (green), and ESG performance and risk management (yellow & blue). In the red cluster, the most frequently happening word is sustainability ESG, CSR, and financial performance and banking industry. The red cluster emphasizes the connection between environmental performance and corporate social responsibility, particularly how environmental policies affect the financial and economic performance of banks (Brogi & Lagasio, 2019; Gangi et al., 2019; Shen et al., 2016). Nodes in the green cluster also directly relate environmental performance to the size of the board of directors, including the gender balance of the board (Birindelli et al., 2018). Further, when the highest level of direct responsibility for climate-related issues is placed in the hands of the board or a senior executive, environmental performance is more likely to improve (Galletta et al., 2021). Moreover,

the green cluster indicates that existing studies pertaining to the banking business model and environment management have focused on commercial banks, whereas none have examined in depth other banking business models, such as investment and private banking, which also affect ESG profiles. This cluster focuses on the relationship between corporate governance and social performance, especially in relation to corporate responsibility. The role of corporate governance is integral to CSR in terms of reporting, disclosure, and compliance, as well as in terms of lowering agency costs for stakeholders (Miralles-Quirós, Miralles-Quirós, & Hernández, 2019). According to the cluster nodes, ESG policies, business models, and financial as well as environmental performance are affected by the size and structure of the financial intermediary and the (Prorokowski, 2016; Zhou et al., 2020).

The yellow and green clusters indicate that ESG factors are incorporated into the risk management function and the company's financing decisions through formal policies and governance procedures (BCBS, 2021; EBA, 2021). In view of this, it is imperative that the banking industry reconsiders the financial risks associated with renewing investments in carbon-intensive energy technologies. To this end, banks should disclose the financial and material risks associated with climate change, their own emission reduction strategies, and the emissions associated with their own financing and investment. In regard to their loans to polluting companies (oil and gas), banks are experiencing worsening operational, credit, political, and reputational risks in such a way that they are being urged to disclose the environmental impacts of their lending activities (Nandy & Lodh, 2012).

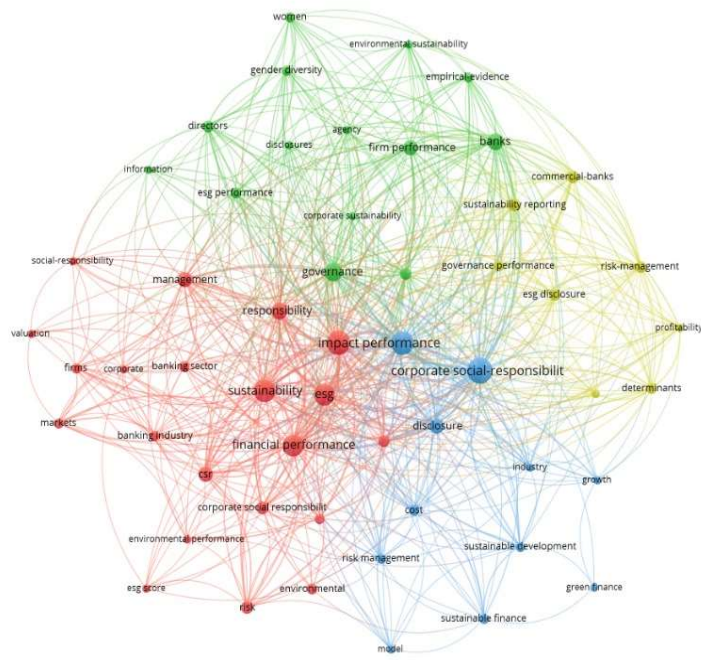


Figure 1: Keyword Analysis

Further, we conducted a bibliographic coupling analysis to identify the streams and critically discussed the current state of the ESG and banking literature. According to the results of this analysis, four major research streams can be identified, which are labeled red, green, blue, and yellow. Research in this red cluster discusses determinants of a bank's sustainability performance and their impact on its financial performance.

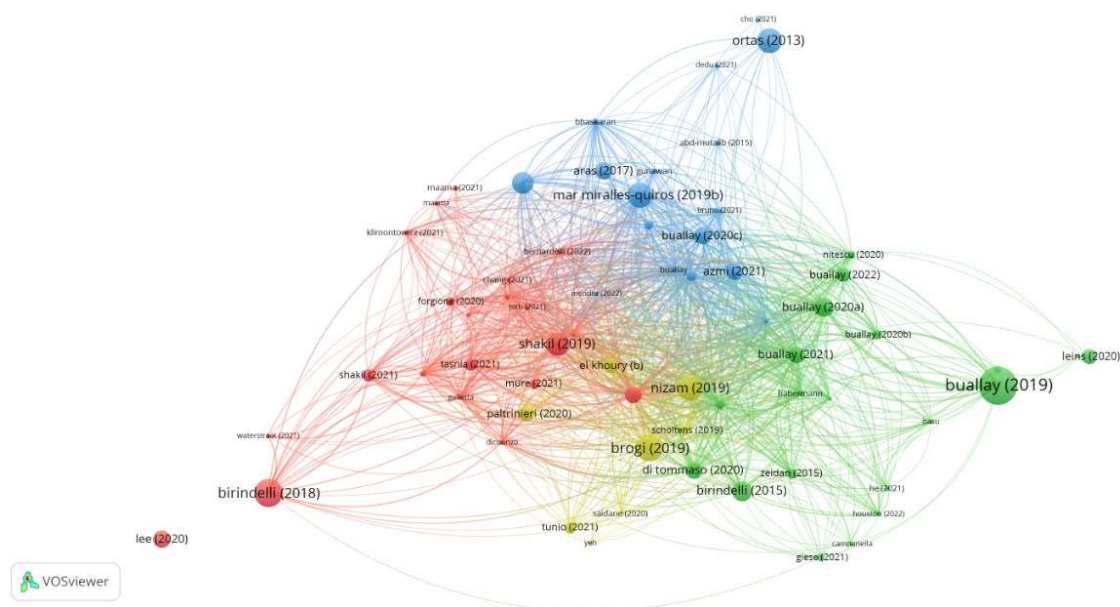


Figure 2: Bibliographic Coupling

The results of these studies indicate that banks are under a lot of pressure from financial stakeholders to change their management systems and incorporate ESG issues into their corporate governance practices. In addition to providing accountability, compliance, and transparency, corporate governance is a crucial component of corporate social responsibility. Specifically, the board's composition and size contribute positively to the overall integration of sustainability into banks' decision-making processes, followed by the adoption of Enterprise Risk Management processes and the development of remuneration policies based on non-financial performance metrics (Dicuonzo et al., 2022).

The second key determinant of sustainability is firm size and profitability. Banks with lower profitability and larger sizes have increased ESG transparency consistent with legitimacy theory. As larger banks do not face any survival issues in the short run, so they long term value creation CSR projects in order to build moral capital. Alternatively, the bank may conceal its poor performance by providing more information about its social behavior, beliefs, and activities when



it encounters poor performance. As a result, shareholders' concerns will be diverted. (El Khoury et al., 2021).

Banks, however, are unsure if ESG policies will increase their incomes to offset their increased expenses. As energy-saving measures had been implemented on a large scale in advanced economies, banks were able to be cost-effective by engaging in environmentally friendly activities. In developing countries, socially responsible operations and strong governance have led to an improvement in customer confidence and their perception of banks. As a result of socially responsible operations and strong governance, banks in developing countries have been able to become more cost-effective by improving their image and customer confidence (Bernardelli et al., 2022; Chang et al., 2021; Klimontowicz et al., 2021).

Amosh & Khatib (2022) examines the relationship between website visitors and bank performance. According to the results, website visitors improve the chances of improving the financial performance of the banking industry. Additionally, banks with excellent ESG performance receive a substantial number of client visits, resulting in superior financial results. Bataet al.(2021) examined the relationship between the environmental, social, and governance pillars and bank financial performance. Emission reduction improves financial performance. In contrast, it is possible for accounting and market performance to conflict with a bank's product quality and social responsibility policies.

A few studies have shown a negative correlation between ESG performance and financial success. Due to the higher costs associated with implementing and reporting on ESG operations, ESG reporting may negatively impact banks' financial viability. It may become increasingly difficult for corporations to engage in initiatives without considering their environmental and social impacts as they become more socially and environmentally responsible. The profitability of

companies that are environmentally and socially responsible may suffer as a result of rejecting profitable but unfavorable ventures. In order to disclose broad ESG information, significant resources are required since this involves discovering, measuring, and reporting this information. In addition to the contractual implications, there are also reputational and regulatory implications associated with ESG procedures, practices, and performance data. If banks make a mistake when disclosing ESG information, they are more likely to receive negative press. By reporting on their ESG operations, these corporations expose themselves to public scrutiny, which can be exploited by competitors, the community, and detractors for propaganda purposes (Buallay, 2020; He et al., 2018; Maama, 2021).

### 3. Methodology and Data

#### 3.1. Empirical Methodology

This paper examines market reactions to the bank's sustainability performance. In this regard, the main research question is whether the market has started resolving the cost of externalities. This is further dependent on the market's ability to understand and interpret ESG reporting. We used three market indicators as proxies for market behavior. The first indicator is the Information Asymmetry, as the ESG reports provide additional information to the capital markets, that is why ESG performances reduces the information gap between insider and outsider and facilitate the decision-making process of investors and analysts we developed the following model to estimate the relationship between corporate social reasonability performance of the bank and information Asymmetry.

$$Inform\_Asymmetry_{it} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 X_{it} + \beta_3 Y_{it} + \varepsilon_{it} \quad (1)$$

Where  $Inform\_Asymmetry_{it}$  is the information asymmetry of the bank which is estimated by standard deviation of the analysts forecast and bid ask spread,  $ESG_{it}$  represents its corporate social

responsibility of the bank,  $X_{it}$  represents the characteristics of the board, and  $Y_{it}$  represents a list of bank-specific control variables that have been identified in previous empirical work as influencing bank risk.

This improved understanding of the company's future prospects also reduces market uncertainty, thereby reducing the company's market risk. In addition, sustainability performance helps banks build moral capital, which lowers transition risk and reputational risk (Hamrouni et al., 2021; Nitescu & Cristea, 2020). To estimate this hypothesis, we developed model 2 as follows:

$$r_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 X_{it} + \beta_3 Y_{it} + \varepsilon_{it} \quad (2)$$

The dependent variable  $r_{it}$  measures the risk of bank  $i$  over period  $t$ , whereas the vectors  $X_{it}$  and  $Y_{it}$  represent the board characteristics and bank specific variables that can influence a bank's risk. A reduced level of risk has value implications for banks. Banks that are more sustainable have a higher market value (Azmi et al., 2021) This hypothesis is estimated by the model (3) as follows:

$$V_{it} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 X_{it} + \beta_3 Y_{it} + \varepsilon_{it} \quad (3)$$

Here,  $V_{it}$  represents the value of the bank as a dependent variable. If the coefficients of ESG exhibit a negative coefficient in the models (1) and (2) and in the model (3), the coefficient is positive, indicating that the market is clearly able to understand what is disclosed in ESG reporting and can establish a link between banks' sustainability performance and financial performance. In contrast, inconsistencies in this valuation link would indicate that the market is either incapable of interpreting or does not trust ESG reporting. In order to determine robustness, we examined a number of measures of bank risk and bank value commonly employed in empirical studies. For Information Asymmetry, we used risk density and the ratio of non-performing loans to total loans, that are widely used indicators of bank risk (Kishore, 2018; Schulte & Winkler,

2019). Book value of equity, and stock market price are used to value the bank(Di Tommaso & Thornton, 2020).

The ESG score of banks is used as a proxy for measuring a bank's corporate social responsibility performance. We have extracted the data of ESG performance from the Refinitiv data base. Refinitiv captures and calculates over 630 ESG measures at the company level. This includes a subset of 186 of the most comparable and relevant metrics per industry driving the overall company assessment and scoring process. These are organized into ten categories that reformulate the three pillar scores and the final ESG score. This score reflects the company's ESG performance, commitment, and effectiveness based on publicly available information. The category scores are aggregated into environmental, social, and corporate governance scores. Environmental and social category weights vary by industry for the ESG pillar score. Regarding governance, the same weights apply to all industries. Executive board characteristics that have been shown to affect bank risk taking and valuation are contained in the vector  $X_{i,t}$ . These variables include banks size board independence and board gender diversity. Similarly, vector  $Y_{i,t}$  contains the list of variables reported in recent literature to impact bank risk taking and valuation. These variables include bank size, profitability, leverage, loan provision and efficiency (Birindelli et al., 2015; Nandy & Lodh, 2012; Shakil et al., 2020) All variables are listed and defined in Table 1. We extracted a global dataset of all variables from Refinitiv database for the period ranging from 2013 to 2022 consisting of 1532 banks .

**Table1: Variable and Description**

<b>Variables</b>	<b>Proxies</b>	<b>Definition</b>
<b>Dependent Variables</b>		
Information Asymmetry	Standard deviation of analysts' target price estimate Bid ask Spread	The statistical average of all broker estimates determined to be on the majority accounting basis. Price Target is the projected price level forecasted by the analyst within a specific time horizon. $(Ask - Bid) / ((Ask + Bid) / 2)$
Risk	Non-Performing Loan Risk Density	Ratio of nonperforming loans to total loans Amount of risk-weighted assets (RWA) over total assets reported on the balance sheet
<b>Valuation</b>	Book value of equity stock market price	Value of capital per share as shown in each bank's balance sheet Annual stock market Price
<b>Independent Variable</b>		
ESG Performance	ESG rating score	Equal-weighted rating, based on the data in ASSET4's economic, environmental, social, and corporate governance pillars at given year
Pillar Score	Environmental pillar score, Social Pillar Score, Governance pillar score	ESG pillar scores are the relative sum of the category weights. Environmental pillar score consist of ,Emission ,resource use and innovation: Social score consistas of workforce score, human rights score,community score, product responsibility score and Governance score consists of management score,shareholders score, CSR strategy score
Pillars Ingredient Score		Refinitiv ESG resource use score, emissions reduction score, innovation score,workforce score, human rights score,community score, product responsibility score, management score,shareholders score, CSR strategy score
<b>Control Variables</b>		
Board charachteristics	Board Size	The number of directors sitting on the board at given year

Firm specific variables	Board independence	The percentage of independent non-executive directors on the board at given year
	Board gender	Percentage of women managers
	Bank size	Natural logarithm of total assets at given year
	Profitability	The ratio of earnings before interest and taxes (to book value of total assets at given year
	Leverage	The ratio of total book value of liabilities to total assets at given year
Loan Ratio	Business model indicator which measures the loan exposures as total gross loans over total assets	

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## 4. Results

### 4.1 Descriptive Statistics

Table 2 provides a summary of the descriptive statistics for our sample of banks. The average ESG score for the sample is 42, with individual scores of 29 for environmental performance, 41 for social performance, and 50 for governance performance. These results suggest that, on average, the banks in the sample exhibit satisfactory levels of adherence to ESG principles. An interesting trend observed is that the banks tend to place more emphasis on social and governance performance, while giving relatively less importance to environmental performance. Banks may focus more on governance and social performance than environmental performance for a variety of reasons. One reason is that governance and social performance are often more directly related to the bank's operations and its relationships with stakeholders, such as customers and shareholders. Banks are highly regulated and are closely watched by regulators and investors, so strong governance and social performance can help to build trust and maintain a positive reputation.

Additionally, the standard deviation of target price and bid-ask spread, which serve as indicators of information asymmetry, are found to be positive. This suggests that analysts and investors may be disproportionately reacting to the ESG performance of these banks. The risk density, on average, is 0.55, indicating that, on average, 55% of total assets are risk weighted. The non-performing loan ratio, on average, is 2%, indicating that 2% of total loans are non-performing.

The average board size is 11 directors, of which 54% are independent directors. Furthermore, female managers constitute 51% of the total number of managers working within the bank.

Table2: Descriptive Statistics

Variable	Obs	Mean	Std.dev.	Min	Max
ESG	7,713	42	17.32	17.84	71.27
EN_PS	7,713	29	26.73	0	77.39
SOC_PS	7,713	41	20.08	13.14	74.95
GOV_PS	7,713	50	19.88	19.35	78.72

PT_SD	7,682	11.14	1.299	0	3.905
BIDASK_SPRD	7,704	.0054	.0061	.0004	.0194
Risk_Density	7,703	.55	.2597	0	.8532
NON_PER_L	7,687	.0276	.0273	.0033	.0905
MP	7,705	15.10	14.77	.4653	43.32
BV_S	7,707	13.72	13.46	.4111	40.71
BS_SC	7,713	11.45	3.100	7	17
IBM	7,713	54.87	27.51	13.15	94.64
WM_SC	7,713	51.65	33.30	5.629	95
PROF	7,563	.9826	.0900	.8113	1.143
Size	7,574	10.32	.6853	9.301	11.44
LEV	7,684	1.119	.9607	.1032	3.056
Loan_Ratio	7,609	.6287	.15774	.3183	.8284

#### 4.2 Pairwise correlation

The analysis of the pairwise correlation matrix revealed that there is no significant multicollinearity present, as all correlation coefficients were less than 0.70. This suggests that there is no strong correlation between the independent variables. To further verify this, we also calculated the variance inflation factors (VIFs) for the main and disaggregated analyses and found that all VIFs were below the threshold of 3, as suggested by O'Brien (2007), indicating that there is no multicollinearity present.

{Insert Table 3, 4 and 5 Here}

#### 4.3 Regression Analysis

Table 6 presents the results of our pooled fixed effect regression analysis, which is divided into three panels for examination. Panel A examines the impact of ESG performance on a bank's informational Asymmetry, Panel B looks at the effect of sustainability on a bank's risk profile, and Panel C analyzes the impact of sustainability on firm valuation. To ensure robustness, we used two



variables for each dimension in the analysis. Information asymmetry is measured by standard deviation of analysts' forecasts and bid-ask spread, risk in banks is calculated by risk density and non-performing loans as a percentage of total loans, and bank value is determined by market share prices and book value per share.

**Table 6: Fixed Effect Regression model with lagged dependent variable**

VARIABLES	Panel A: Information Asymmetry		Panel B: Risk		Panel C: Valuation	
	PT_SD	BIDASK_SPRD	Risk density	NON_PERL	MP	BV_S
Lag_Dep Variable	0.282*** (0.0172)	0.216*** (0.0171)	0.252*** (0.0182)	0.242*** (0.0202)	0.238*** (0.0181)	0.179*** (0.0151)
ESG	-0.0172*** (0.00175)	-0.000113*** (1.18e-05)	-0.00401*** (0.000415)	-0.000313*** (4.00e-05)	0.165*** (0.0162)	0.100*** (0.0132)
BS_SCORE	0.00347 (0.00750)	7.59e-05* (4.19e-05)	0.00681*** (0.00172)	0.000686*** (0.000143)	0.0273 (0.0607)	-0.0362 (0.0416)
IBM_SC	-0.00202*** (0.000643)	3.78e-06 (3.99e-06)	0.000222 (0.000161)	3.60e-06 (1.24e-05)	0.00942* (0.00531)	0.00102 (0.00365)
WM_SC	0.00182** (0.000915)	3.84e-06 (5.58e-06)	0.000252 (0.000203)	5.16e-05*** (1.57e-05)	- (0.00704)	-0.0119** (0.00518)
PROF	-0.278** (0.115)	0.00127* (0.000743)	0.0521** (0.0255)	0.00223 (0.00310)	2.658*** (0.943)	-0.939 (0.663)
Size	-1.636*** (0.129)	-0.00252*** (0.000636)	-0.274*** (0.0312)	-0.0112*** (0.00193)	10.51*** -1.140	11.06*** -1.145
LEV	0.0589*** (0.0222)	0.000569*** (0.000135)	0.0192*** (0.00462)	0.00124*** (0.000453)	-0.700*** (0.179)	-0.871*** (0.152)
Loan_Ratio	-0.493*** (0.152)	-0.00140 (0.00108)	0.0359 (0.0374)	-0.00598 (0.00435)	4.160*** -1.381	2.880*** (0.935)
Constant	18.88*** -1.315	0.0326*** (0.00647)	3.216*** (0.310)	0.138*** (0.0201)	-107.8*** (11.60)	-106.0*** (11.43)
Observations	7,371	7,411	7,41	7,38	7,411	7,416
R-squared	0.397	0.160	0.272	0.184	0.418	0.425
Number of ID	769	769	769	769	769	769

Robust standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The results presented in Panel A indicate that the coefficients of standard deviation of analysts' forecast and bid-ask spread are both statistically significant and negative. This finding suggests that an improvement in Environmental, Social, and Governance (ESG) performance enhances the informational environment of the banks, thereby facilitating the ability of investors and analysts to make more accurate forecasting and investment decisions. These results are consistent with prior literature, which posits that better disclosure quality improves analysts' understanding of a bank's performance and future prospects, resulting in higher forecast accuracy and lower forecast variances (Hope, 2003; Lang and Lundholm, 1996). Analysts typically utilize both financial and non-financial information when forecasting earnings (Coram et al., 2011; García-Meca and Martínez, 2007; Ghosh and Wu, 2012; Maines et al., 2002; Orens and Lybaert, 2010; Pflugrath et al., 2011; Simpson, 2010). Thus, the availability of non-financial information, such as ESG data, can serve to reduce the error and dispersion of analyst earnings forecasts, as well as increase the likelihood of optimistic recommendations for companies with high Corporate Social Responsibility (CSR) ratings (Ioannou and Serafeim, 2015).

Furthermore, the statistically significant and negative coefficients of bid-ask spread in this study suggest that Environmental, Social, and Governance (ESG) information plays a facilitative role in the investment decision-making process by providing a more comprehensive understanding of a company's performance. The availability of high-quality and consistent ESG information enables investors to more effectively integrate ESG factors and risks into their investment decisions, as previously demonstrated by Delisle et al. (2021). Additionally, ESG data can provide valuable insights that were previously unobservable, thereby facilitating the identification of favorable investment outcomes and augmenting investors' confidence in their decisions. This is in line with the findings of In et al. (2019) which highlights that the utilization of ESG data can lead

to improved investment decisions by providing a more complete understanding of a company's overall performance.

The findings in Panel B illustrate a negative correlation between Environmental, Social, and Governance (ESG) performance and risk as demonstrated by the risk density and non-performing loan ratio. This correlation can be attributed to various mechanisms through which ESG performance impacts risk. Banks with robust ESG practices may be less exposed to negative publicity or legal action in relation to their environmental and social impact, thereby reducing reputational risks (Galletta et al., 2022; Murè et al., 2021; Neitzert & Petras, 2022). Additionally, these institutions may possess a greater capacity to adapt to changes in regulations and consumer preferences concerning sustainability, resulting in a reduction of operational and financial risks (Bruno & Lagasio, 2021; Sassen et al., 2016). Banks with strong ESG practices may also be less likely to extend loans to companies and individuals with weak ESG practices, thereby reducing credit risk and defaults (Lee et al., 2022; Schulte & Winkler, 2019). Furthermore, banks with strong ESG practices may be less likely to contravene regulations related to the environment and society, thus reducing the risk of fines and penalties. It is important to consider that other factors, such as the bank's risk management practices, economic conditions, and regulatory environment also play a significant role in determining risk.

A Positive response is observed in the valuation coefficients in panel C. Our findings are in line with previous studies, reinforcing prior findings that when a bank demonstrates strong environmental, social, and governance (ESG) performance, it may be perceived as a more responsible corporate entity with a greater likelihood of long-term sustainability. This can result in increased trust and loyalty from customers and may also make the bank more attractive to investors who prioritize socially responsible investments (Alsayegh et al., 2020; Chiaramonte et

al., 2022; Miralles-Quirós, Miralles-Quirós, & Hernández, 2019). Furthermore, a bank with strong ESG performance may be less susceptible to negative publicity or reputational harm, which can negatively impact its market performance. The effect of ESG performance on a bank's market performance can manifest through changes in investor and consumer perceptions, as well as through increased regulatory scrutiny and fines impacting the bank's financial performance (Bhaskaran et al., 2021; Buallay, Fadel, Alajmi, et al., 2020; Manta et al., 2020; Miralles-Quirós, Miralles-Quirós, & Redondo-Hernández, 2019).

The evidence presented above demonstrates that market indicators have a synchronized response to the ESG performance of banks, thereby strengthening the efficient market hypothesis that the market now can read and interpret ESG performance and establish a link between sustainability performance and market performance of the banking sector. This suggests that the market is remediating the banks' environmental, social and governance performance and it's becoming an important aspect for the market participants to consider when making investment decisions.

#### **4.4 Disaggregated Analysis**

We examined the impact of the pillar scores for each of the three models and the results are presented in Table 7. Our decision to analyze the individual dimensions of ESG was motivated by the fact that different industries have unique characteristics and companies within each industry face varying pressures from stakeholders. Thus, it is hypothesized that each industry may only benefit by focusing on one or more of the three ESG factors that are most relevant to their specific context. For example, within the banking industry, stakeholders may be particularly interested in banks' lending practices rather than philanthropic contributions.

**Table 7: Disaggregated Fixed Effect Regression Analysis**

	Panel A: Information Asymmetry		Panel B: Risk		Panel C: Valuation	
VARIABLES	PT_SD	BIDASK_SPRD	Risk_Density	WNON_PERL	MP	BV_S
PT_SD	0.266*** (0.0167)	0.208*** (0.0166)	0.246*** (0.0177)	0.235*** (0.0201)	0.222*** (0.0167)	0.174*** (0.0144)
EN_PS	-0.0039*** (0.00148)	1.60e-05* (8.36e-06)	-0.000645** (0.000274)	-8.90e-05*** (3.12e-05)	0.0238** (0.0101)	-0.00407 (0.0109)
SOC_PS	-0.0043*** (0.00165)	-5.64e-05*** (1.05e-05)	-0.00106*** (0.000386)	-7.68e-05** (3.69e-05)	0.0200 (0.0127)	0.00306 (0.0107)
GOV_PS	-0.0132*** (0.00161)	-7.29e-05*** (1.01e-05)	-0.00250*** (0.000339)	-0.000174*** (3.55e-05)	0.148*** (0.0137)	0.0872*** (0.00983)
BS_SCORE	0.00776 (0.00743)	9.10e-05** (4.20e-05)	0.00745*** (0.00170)	0.000741*** (0.000143)	-0.00285 (0.0590)	-0.0534 (0.0413)
IBM_SC	-0.000890 (0.000616)	7.28e-06* (3.90e-06)	0.000396** (0.000160)	1.82e-05 (1.22e-05)	-0.00162 (0.00503)	-0.00476 (0.00369)
WM_SC	0.00219** (0.000909)	5.12e-06 (5.28e-06)	0.000305 (0.000200)	5.60e-05*** (1.56e-05)	-0.0306*** (0.00685)	-0.0139*** (0.00508)
PROF	-0.214* (0.112)	0.00146** (0.000731)	0.0592** (0.0253)	0.00290 (0.00312)	2.246** (0.907)	-1.190* (0.644)
Size	-1.382*** (0.124)	-0.00189*** (0.000661)	-0.241*** (0.0310)	-0.00826*** (0.00207)	8.453*** -1.102	9.918*** -1.146
LEV	0.0586*** (0.0210)	0.000517*** (0.000138)	0.0193*** (0.00462)	0.00132*** (0.000463)	-0.672*** (0.171)	-0.824*** (0.149)
Loan_Ratio	-0.343** (0.149)	-0.00104 (0.00111)	0.0577 (0.0382)	-0.00416 (0.00442)	2.751** -1.329	2.206** (0.925)
Constant	16.22*** -1.272	0.0261*** (0.00676)	2.852*** (0.310)	0.106*** (0.0218)	-85.84*** (11.28)	-94.25*** (11.53)
Observations	7,371	7,411	7,41	7,38	7,411	7,416
R-squared	0.427	0.177	0.285	0.195	0.466	0.454
Number of ID	769	769	769	769	769	769

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Our findings in table 7 indicates that environmental and governance pillars replicate in synchronized way whereas social pillar is only significant and negative for information asymmetry, but it is insignificant for valuation proxies in panel C. These findings suggest that banks pay more attention to governance and environmental pillars of ESG because these factors have a direct impact on the financial performance and risk profile of the companies, they invest in. Governance refers to the management and oversight of a company, including issues such as board composition, executive compensation, and transparency. A company with strong governance practices is less likely to engage in unethical or illegal activities and is more likely to be well-managed and financially stable. Environmental factors, such as a company's carbon footprint or water usage, can also have a direct impact on its financial performance, as well as its regulatory and reputational risks. On the other hand, social factors, such as labor practices or community relations, may be important from a reputational and ethical standpoint, but they may not have as direct of an impact on a company's value.

#### **4.5 Geographical Analysis**

In this study, a global dataset of banks from Asia, Europe, the Americas, and Oceania was employed. While sustainability is a worldwide phenomenon and all countries are taking measures to align with sustainable development goals, the market response to environmental, social, and governance (ESG) performance may vary among regions due to regional and institutional differences. Therefore, a geographical analysis was performed to determine if market behavior towards ESG performance varies across regions. The results of this analysis are presented in Table 8. In the banking sector, ESG (Environmental, Social, and Governance) performance has become increasingly significant for market indicators in the EU and Americas. This is largely due to the implementation of regulations such as the Non-Financial Reporting Directive (NFRD) and the Sustainable Finance Disclosure Regulation (SFDR) in the EU, which require banks to disclose and

manage their ESG risks and opportunities. Additionally, institutional investors in the EU have been increasingly incorporating ESG factors into their investment decision-making process, driving banks to improve their ESG performance. In the Americas, regulatory developments such as the Securities and Exchange Commission's (SEC) interpretive guidance on ESG disclosure and the Task Force on Climate-related Financial Disclosures (TCFD) recommendations, have also encouraged banks to improve their ESG performance.

In Asia, the level of awareness and understanding of ESG issues is relatively low among investors, companies, and policymakers, which could contribute to a lack of emphasis on ESG performance in the market. Furthermore, cultural attitudes towards sustainability in these regions may not place as much emphasis on ESG performance compared to the EU and Americas.

However, as far as asymmetric response in Oceania is concerned, there is a limited regulatory framework in place to encourage banks to disclose and manage their ESG risks and opportunities. Additionally, the focus on economic growth in these regions may also lead to less attention being paid to ESG performance. However, it's worth noting that the subject is quite complex, and it is not only limited to these factors, also other factors such as the level of development of the country, the stage of corporate governance and the level of awareness of ESG issues among investors and banks may play a role that we recommend for future research to take into consideration.

**Table 8: Regional Analysis Fixed Effect**

		Panel A: Information Asymetry		Panel B: Risk		Panel C: Valuation	
Region	VARIABLES	PT_SD	BIDASK_SPRD	Riskdensity	NON_PERL	MP	BV_S
Asia	lag Dependent Variable	0.220*** (0.0287)	0.100*** (0.0258)	0.0349* (0.0193)	0.166*** (0.0270)	0.213*** (0.0278)	0.0469*** (0.0115)
	WESG	-0.00167 (0.00187)	1.50e-05 (1.34e-05)	-0.000307 (0.000386)	9.23e-05* (5.13e-05)	-0.00565 (0.0131)	0.0178*** (0.00659)

	WBS_SCORE	-0.0366*** (0.0133)	7.50e-07 (7.42e-05)	0.00137 (0.00214)	0.000382 (0.000239)	0.345*** (0.0729)	0.0950** (0.0467)
	WIBM_SC	- 0.00446*** (0.00109)	3.36e-06 (5.77e-06)	0.000643*** (0.000197)	7.09e-06 (2.47e-05)	0.0357*** (0.00645)	0.00938*** (0.00341)
	WWM_SC	0.000532 (0.00116)	9.08e-06 (1.48e-05)	-0.000672* (0.000355)	-4.62e-05 (3.57e-05)	-0.0136 (0.00888)	0.00178 (0.00441)
	WPROF	0.0656 (0.148)	0.00217* (0.00131)	0.0791* (0.0443)	0.0118** (0.00562)	1.970** (0.846)	-0.101 (0.492)
	WSize	-0.858*** (0.167)	-0.00591*** (0.00159)	-0.195*** (0.0433)	-0.0125** (0.00516)	4.058*** (0.904)	2.352*** (0.511)
	WLEV	-0.0867*** (0.0218)	9.98e-05 (0.000192)	-0.0121** (0.00511)	-0.000680 (0.000706)	0.589*** (0.130)	0.0844 (0.0748)
	WLoan_Ratio	0.00404 (0.135)	-0.00408** (0.00178)	-0.00224 (0.0576)	-0.0201** (0.00799)	2.872*** (-1.011)	2.310*** (0.884)
	Constant	10.16*** -1.705	0.0663*** (0.0162)	2.536*** (0.434)	0.155*** (0.0528)	-47.42*** -9.458	-21.03*** -5.219
	Observations	3,397	3,435	3,435	3,419	3,435	3,431
	R-squared	0.278	0.039	0.045	0.073	0.411	0.186
	Number of ID	344	344	344	344	344	344
<b>Europe</b>	lag Dependent Variable	0.356*** (0.0626)	0.126*** (0.0402)	0.277*** (0.0516)	0.403*** (0.0444)	0.260*** (0.0569)	0.137*** (0.0504)
	WESG	-0.0236*** (0.00407)	-0.000199*** (2.43e-05)	-0.00667*** (0.000923)	-0.00072*** (0.000108)	0.270*** (0.0488)	0.0205 (0.0410)
	WBS_SCORE	0.0228 (0.0163)	0.000195 (0.000124)	0.00865*** (0.00293)	0.000745** (0.000313)	-0.343* (0.177)	0.0546 (0.123)
	WIBM_SC	-0.00133 (0.00146)	1.13e-05 (8.08e-06)	-0.000463 (0.000340)	-4.24e-05 (2.86e-05)	0.00207 (0.0146)	-0.0100 (0.00919)
	WWM_SC	0.000481 (0.00145)	-2.08e-06 (7.02e-06)	-0.000143 (0.000370)	6.43e-05* (3.47e-05)	-0.0150 (0.0143)	-0.00141 (0.00584)
	WPROF	-0.110 (0.226)	-8.92e-06 (0.00152)	-0.0335 (0.0502)	0.00117 (0.00669)	-1.330 -2.336	-3.611*** -1.371
	WSize	-0.772* (0.451)	4.40e-05 (0.00168)	-0.160* (0.0944)	-0.00180 (0.00860)	2.171 -4.570	12.50*** -4.620
	WLEV	-0.0307 (0.0703)	0.000919** (0.000374)	0.0214 (0.0151)	0.00487*** (0.00174)	-0.794 (0.570)	0.103 (0.382)
	WLoan_Ratio	-0.515	0.00290	0.207**	0.0152	-2.190	3.285



	Constant	(0.330) 10.84** -4.766	(0.00202) 0.00772 (0.0177)	(0.101) 2.173** -1.028	(0.00996) 0.0518 (0.0903)	-5.147 -15.93 (51.20)	-3.081 -119.4** (49.09)	
	Observations	812	812	812	810	813	817	
	R-squared	0.419	0.392	0.422	0.568	0.439	0.195	
	Number of ID	98	98	98	98	98	98	
Americas	lag Dependent Variable	0.253*** (0.0197)	0.311*** (0.0213)	0.342*** (0.0203)	0.222*** (0.0309)	0.195*** (0.0205)	0.237*** (0.0214)	
	WESG	-0.0314*** (0.00338)	-0.000196*** (1.66e-05)	-0.00662*** (0.000705)	- 0.000492*** (5.13e-05)	0.293*** (0.0269)	0.224*** (0.0240)	
	WBS_SCORE	0.00307 (0.0104)	-2.74e-05 (5.21e-05)	0.00500* (0.00287)	0.000378* (0.000194)	0.0745 (0.0822)	0.0184 (0.0632)	
	WIBM_SC	-0.00228** (0.000933)	-5.26e-06 (5.49e-06)	-0.000141 (0.000246)	-7.00e-06 (1.40e-05)	0.00731 (0.00691)	0.0117** (0.00535)	
	WWM_SC	0.000980 (0.00125)	-1.36e-06 (7.21e-06)	0.000244 (0.000273)	2.39e-05 (1.95e-05)	-0.0189** (0.00950)	-0.0136* (0.00691)	
	WPROF	-0.776*** (0.177)	-0.00110 (0.00101)	-0.0145 (0.0384)	-0.0116*** (0.00384)	6.373*** -1.436	1.567 -1.027	
	WSize	-1.788*** (0.171)	-0.000210 (0.000642)	-0.252*** (0.0388)	-0.00872*** (0.00217)	11.69*** -1.629	11.27*** -1.505	
	WLEV	0.0737 (0.0461)	0.000396* (0.000237)	0.0189* (0.00962)	0.000305 (0.000740)	-0.930** (0.401)	-0.885** (0.373)	
	WLoan_Ratio	-1.367*** (0.271)	-0.00116 (0.00173)	-0.0726 (0.0553)	-0.0100* (0.00581)	10.57*** -2.326	6.038*** -1.472	
	Constant	21.81*** -1.695	0.0149** (0.00676)	3.101*** (0.377)	0.129*** (0.0235)	-119.7*** (16.17)	-110.3*** (14.48)	
		Observations	3,063	3,065	3,064	3,052	3,064	3,069
		R-squared	0.499	0.356	0.432	0.318	0.531	0.617
		Number of ID	317	317	317	317	317	317
	Oceania	lag Dependent Variable	0.124 (0.0923)	0.312*** (0.0670)	0.125 (0.0841)	0.366*** (0.0328)	0.0289 (0.0229)	0.0271 (0.0529)
		WESG	-0.00642 (0.00377)	-0.000296** (0.000119)	-0.00165** (0.000598)	-3.66e-06 (0.000216)	0.0541* (0.0244)	0.0199 (0.0115)
WBS_SCORE		0.0872	0.000160	0.00406	0.00381	-0.305	-0.289	

	(0.0496)	(0.000328)	(0.00490)	(0.00210)	(0.646)	(0.166)
WIBM_SC	-0.00271*	-4.06e-05	0.000211	-0.000144	-0.0190	0.00393
	(0.00130)	(3.22e-05)	(0.000188)	(9.20e-05)	(0.0149)	(0.0102)
WWM_SC	-0.00131	-2.79e-05	-0.000358	-0.000145	0.0388	0.00734
	(0.00224)	(4.18e-05)	(0.000248)	(0.000109)	(0.0358)	(0.0115)
WPROF	1.098*	0.00725*	0.0614	0.0360	-14.57*	-2.572
	(0.566)	(0.00394)	(0.0503)	(0.0203)	-7.919	-1.670
WSize	-0.228	-0.0110	-0.0937	-0.00332	2.640	2.044
	(0.351)	(0.00760)	(0.0560)	(0.00865)	-3.280	-1.760
WLEV	0.208**	0.00144	0.0134*	0.00243	-1.514*	-0.980
	(0.0873)	(0.000827)	(0.00726)	(0.00149)	(0.707)	(0.542)
WLoan_Ratio	-0.143	0.000439	0.0126	-0.00422	-2.232	-1.528
	(0.881)	(0.00653)	(0.0397)	(0.0290)	-4.844	(0.899)
Constant	1.803	0.132	1.321*	-0.00793	3.583	-5.748
	-3.936	(0.0808)	(0.618)	(0.113)	(39.52)	(19.54)
Observations	99	99	99	99	99	99
R-squared	0.256	0.631	0.474	0.341	0.240	0.211
Number of ID	10	10	10	10	10	10

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.

#### 4.6 Additional Analysis

In the literature, it has been recognized that ESG data is subject to endogeneity, a problem that can lead to biased and inconsistent estimates of parameters. To address this issue, we employed a fixed effect model with a lagged dependent variable. This approach allows for controlling for unobserved individual-specific effects that may be correlated with the independent variable and error term, thus reducing bias and increasing the consistency of estimates. However, to ensure the robustness of our results, we also conducted a robustness check by replicating the entire analysis using the Two-Stage Least Squares (2SLS) method. This method addresses endogeneity by using an instrumental variable in the first stage to estimate the endogenous independent variable, and then using the estimated endogenous variable in the second stage to estimate the parameters of the model.

In the first stage of our 2SLS method, we used firm profitability as an instrumental variable to estimate the value of ESG. This choice of instrument variable is based on the theory of resource dependency, which posits that profitable firms have a competitive advantage over their rivals when investing in Corporate Social Responsibility (CSR) programs. Furthermore, prior literature has established a positive correlation between ESG performance and financial performance. Banks with sound financial prospects can afford to invest in long-term projects, such as CSR, which generates moral capital and enhances the financial and market performance of firms. In the second stage of our 2SLS method, we regressed the fitted values of ESG. This approach of using 2SLS and instrumenting ESG performance with profitability allows us to address the problem of endogeneity and provide unbiased and consistent estimates of parameters.

By comparing the results obtained from the fixed effect model with lagged dependent variable and the 2SLS method, this robustness check allows us to ensure that our conclusions are not sensitive to the choice of econometric method. The results of this robustness check are reported in the appendix, enabling readers to evaluate the robustness of our findings.

## **5. Conclusion**

This study is motivated by the need to provide empirical evidence to corroborate the declared benefits of ESG performance in terms of the favorable market condition for ESG performance. In recent times, different initiatives have been taken to promote sustainable corporate behavior. Apart from the immense pressure from the relevant stakeholders, regulatory initiatives like EU action plan on sustainable finance, the Sustainable banking act in US, The Task Force on Climate-related Financial Disclosures (TCFD), The Network for Greening the Financial System (NGFS) and The Basel Committee on Banking Supervision are forcing committee to adopt sustainability in their banking operations. This study is designed to estimate how does market respond to ESG performances of the banks i.e., to test the market efficiency of the ESG

performances of the banks. We linked market efficiency with the response of market indicator to the ESG performances of the banks. We used information asymmetry, banks risk density and credit risk, and value of the banks. If these market indicators respond in a symmetric way, it means that market can read and interpret ESG reporting and can establish a link between sustainability performance and the financial performance of the bank.

Prior studies are mainly aimed at the impact of ESG performances on bank financial performance, market performance (Menicucci & Paolucci, 2022)(Bhaskaran et al., 2021)(Buallay, Fadel, Al-Ajmi, et al., 2020) and or bank risk profile (e.g., Galletta et al., 2022; Murè et al., 2021; Schulte & Winkler, 2019). We believe that our study is novel as it will add evidence to the literature on market efficiency and sustainability of financial sector. Second, we used a comprehensive global dataset from all five continents and the results demonstrated the geographical differences between the different economic zones. It will also allow us to compare the efficacy of different initiatives taken to internalize environmental and social concerns.

We found that market indicators respond in a synchronized way. i.e., superior ESG performances of the banks reduces the information asymmetry, banks risk density, credit risk and higher market value. This synchronized behavior shows that the markets are efficient for the ESG performance of the banks and align the markets response with sustainability goals and could promote sustainable banking practices. Disaggregated analysis shows that only social and governance pillar score are significant and consistent response to the market indicators showing the social and governance pillar score of a bank can provide insight into the bank's commitment to responsible and ethical business practices. A high score in this area can indicate that the bank is taking steps to promote social and environmental responsibility, as well as good governance and transparency. This can be important for both investors and customers, as it can help to build trust

and confidence in the bank. Additionally, a bank with a strong social and governance score may be better equipped to navigate changing societal and regulatory expectations, which can ultimately contribute to long-term market performance. The geographical analysis shows that market indicators of European and Americas market exhibited a significant and consistent response to ESG performances that authenticate their initiatives for the internalization of externalities.

The findings of the study have implication for the investors, regulators and policy makers. If markets are able to efficiently incorporate ESG information into their decision-making, greater disclosure of ESG-related information by banks could lead to better-informed investment decisions and more efficient markets. Markets efficiency in incorporating ESG information help regulators and supervisors could consider incorporating ESG considerations into their oversight of banks to ensure that they are taking into account the risks and opportunities associated with ESG factors. Furthermore, ESG Markets efficiency of banking sector could create opportunities for the development of new investment products and strategies that are specifically focused on ESG factors, which could help to further promote the integration of ESG considerations into financial markets.

Encouraging the development of sustainable banking practices and products. If markets are efficient in incorporating ESG information, this could create incentives for banks to develop sustainable banking practices and products, in order to meet the demands of ESG-conscious investors. It could create incentives for banks to take a long-term perspective on the ESG risks and opportunities, in order to meet the demands of ESG-conscious investors and to ensure that they are well-positioned to take advantage of future opportunities in sustainable banking.

We propose that future research should focus on examining the impact of Environmental, Social and Governance (ESG) investing on market efficiency. This could involve analyzing data

on the performance of ESG-focused investment funds to determine if ESG investing leads to more efficient markets. Additionally, research on the role of ESG factors in credit risk analysis is scarce and further examination is needed. This could involve analyzing data on companies' ESG scores and other ESG-related data, as well as credit risk data, to determine if incorporating ESG factors into credit risk analysis can improve the accuracy of predictions. Additionally, examining the effect of ESG-related regulations and policies on financial markets is important. This could involve analyzing data on the implementation and enforcement of ESG-related regulations and policies, as well as data on financial market performance, to determine if these regulations and policies are having their intended effects. Finally, analyzing the impact of ESG-related information on financial market participants' decision-making by conducting surveys or experiments to understand how investors and other financial market participants use ESG information in their decision-making process and how it affects their investment behavior is crucial.

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## Appendix

**Table 9: Market Respond to ESG Performance using 2SLS**

VARIABLES	Panel A: Information Asymmetry		Panel B: Risk		Panel C: Valuation	
	PT_SD	BIDASK_SPRD	Riskdensity	NON_PERL	MP	BV_S
WESG	-0.0208*** (0.000984)	-0.000128*** (6.49e-06)	-0.00454*** (0.000233)	-0.000372*** (2.20e-05)	0.191*** (0.00720)	0.108*** (0.00531)
WBS_SCORE	0.00773 (0.00493)	0.000104*** (3.25e-05)	0.00787*** (0.00117)	0.000805*** (0.000110)	0.0575 (0.0360)	-0.0296 (0.0266)
WIBM_SC	- 0.00249*** (0.000472)	4.98e-06 (3.12e-06)	0.000339*** (0.000112)	1.27e-05 (1.06e-05)	0.00998*** (0.00346)	0.000307 (0.00255)
WWM_SC	0.00114** (0.000563)	-6.98e-07 (3.72e-06)	0.000174 (0.000134)	5.03e-05*** (1.26e-05)	-0.0242*** (0.00413)	-0.0109*** (0.00304)
WSize	-1.896*** (0.0603)	-0.00298*** (0.000398)	-0.305*** (0.0143)	-0.0141*** (0.00135)	12.62*** (0.442)	12.50*** (0.326)
WLEV	0.0747*** (0.0152)	0.000678*** (1.00e-04)	0.0222*** (0.00359)	0.00135*** (0.000339)	-0.781*** (0.111)	-0.967*** (0.0817)
WLoan_Ratio	-0.479*** (0.108)	-0.00103 (0.000713)	0.0784*** (0.0256)	-0.00571** (0.00242)	2.973*** (0.792)	1.844*** (0.583)
Constant	21.73*** (0.607)	0.0400*** (0.00401)	3.703*** (0.144)	0.178*** (0.0136)	-124.1*** -4.445	-119.1*** -3.279
Observations	7,399	7,42	7,419	7,403	7,419	7,422
Number of ID	769	769	769	769	769	769

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 10: Disaggregated Analysis using 2SLS**

VARIABLES	Panel A: Information Asymmetry		Panel B: Risk		Panel C: Valuation	
	WPT_SD	BIDASK_SPRD	Risk Density	NON_PERL	MP	BV_S
EN_PS	-0.00567*** (0.000820)	1.36e-05** (5.50e-06)	-0.000938*** (0.000198)	0.000115*** (1.87e-05)	0.0346*** (0.00587)	-0.000436 (0.00443)
SOC_PS	-0.00540*** (0.000951)	-6.15e-05*** (6.40e-06)	-0.00126*** (0.000230)	0.000101*** (2.18e-05)	0.0212*** (0.00684)	0.0328*** (0.00516)
GOV_PS	-0.0147*** (0.000838)	-8.15e-05*** (5.64e-06)	-0.00262*** (0.000203)	0.000191*** (1.92e-05)	0.165*** (0.00603)	0.0914*** (0.00455)
BS_SCORE	0.0128*** (0.00478)	0.000121*** (3.22e-05)	0.00864*** (0.00116)	0.000873*** (0.000109)	0.0183 (0.0344)	-0.0502* (0.0259)
IBM_SC	-0.00110** (0.000463)	9.21e-06*** (3.12e-06)	0.000536*** (0.000112)	2.96e-05*** (1.06e-05)	-0.00291 (0.00333)	0.00611** (0.00252)
WM_SC	0.00162*** (0.000547)	1.03e-06 (3.68e-06)	0.000238* (0.000133)	5.57e-05*** (1.25e-05)	0.0283*** (0.00394)	0.0131*** (0.00297)
Size	-1.575*** (0.0603)	-0.00218*** (0.000406)	-0.265*** (0.0146)	-0.0105*** (0.00138)	10.05*** (0.434)	11.21*** (0.327)
LEV	0.0752*** (0.0148)	0.000621*** (9.93e-05)	0.0227*** (0.00357)	0.00146*** (0.000338)	-0.760*** (0.106)	-0.922*** (0.0799)
Loan_Ratio	-0.298*** (0.105)	-0.000577 (0.000707)	0.103*** (0.0255)	-0.00349 (0.00241)	1.394* (0.758)	1.096* (0.571)
Constant	18.40*** (0.611)	0.0318*** (0.00411)	3.268*** (0.148)	0.138*** (0.0140)	-97.34*** -4.396	-106.0*** -3.314
Observations	7,399	7,42	7,419	7,403	7,419	7,422
Number of ID	769	769	769	769	769	769

Standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 11 : 2SLS Overall Geographical  
Analysis**

		Panel A: Information Asymetry		Panel B: Risk		Panel C: Valuation	
ASIA	VARIABLES	PT_SD	BIDASK_SPRD	Risk Density	NON_PERL	MP	BV_S
	ESG	-0.00140 (0.00108)	1.56e-05 (1.11e-05)	-0.000273 (0.000303)	0.000106*** (3.88e-05)	-0.000498 (0.00670)	0.0185*** (0.00379)
	BS_SCORE	-0.0309*** (0.00563)	2.61e-05 (5.77e-05)	0.00216 (0.00158)	0.000530*** (0.000201)	0.423*** (0.0349)	0.102*** (0.0197)
	IBM_SC	0.00522*** (0.000575)	4.30e-06 (5.89e-06)	0.000720*** (0.000161)	2.25e-05 (2.06e-05)	0.0451*** (0.00356)	0.00997*** (0.00201)
	WM_SC	6.23e-05 (0.000983)	9.93e-06 (1.01e-05)	-0.000620** (0.000276)	-4.60e-05 (3.53e-05)	0.0173*** (0.00610)	0.000396 (0.00345)
	WSize	-1.006*** (0.0829)	-0.00614*** (0.000848)	-0.194*** (0.0232)	-0.0131*** (0.00297)	4.087*** (0.512)	2.336*** (0.290)
	LEV	-0.102*** (0.0144)	0.000130 (0.000147)	-0.0118*** (0.00402)	-0.000760 (0.000514)	0.782*** (0.0889)	0.101** (0.0503)
	Loan_Ratio	-0.0362 (0.113)	-0.00394*** (0.00116)	0.000248 (0.0316)	-0.0223*** (0.00405)	1.556** (0.699)	2.103*** (0.395)
	Constant	11.92*** (0.843)	0.0710*** (0.00862)	2.604*** (0.236)	0.177*** (0.0302)	-45.42*** -5.208	-20.58*** -2.944
	Observations	3,416	3,436	3,436	3,428	3,436	3,434
	Number of ID	344	344	344	344	344	344
<u>EUROPE</u>	ESG	-0.0276*** (0.00291)	-0.000214*** (1.40e-05)	-0.00703*** (0.000622)	0.000946*** (6.60e-05)	0.317*** (0.0248)	0.0289 (0.0180)
	BS_SCORE	0.0348** (0.0147)	0.000212*** (7.07e-05)	0.00874*** (0.00315)	0.00106*** (0.000335)	-0.355*** (0.125)	0.0867 (0.0907)
	IBM_SC	-0.00198 (0.00138)	1.31e-05** (6.62e-06)	-0.000351 (0.000294)	-8.70e-05*** (3.12e-05)	-0.00761 (0.0117)	-0.00777 (0.00858)
	WM_SC	-0.000256 (0.00137)	-2.24e-06 (6.59e-06)	-0.000312 (0.000293)	6.87e-05** (3.11e-05)	-0.0124 (0.0117)	0.00124 (0.00848)
	WSize	-1.020*** (0.284)	-0.000329 (0.00136)	-0.277*** (0.0606)	-0.0172*** (0.00643)	4.353* -2.418	14.05*** -1.760
	LEV	0.0299 (0.0575)	0.000921*** (0.000276)	0.0198 (0.0123)	0.00387*** (0.00131)	-0.534 (0.490)	0.308 (0.356)
	Loan_Ratio	-0.142 (0.314)	0.00382** (0.00151)	0.292*** (0.0670)	0.0250*** (0.00720)	-3.931 -2.708	3.455* -1.954
	Constant	13.78*** -2.997	0.0121 (0.0144)	3.476*** (0.640)	0.240*** (0.0679)	-37.33 (25.54)	-139.0*** (18.61)
	Observations	816	816	816	814	815	818

	Number of ID	98	98	98	98	98	98
<u>AMERICAS</u>	ESG	-0.0375*** (0.00185)	-0.000235*** (9.68e-06)	-0.00793*** (0.000431)	- 0.000574*** (2.78e-05)	0.325*** (0.0131)	0.248*** (0.0100)
	BS_SCORE	0.00670 (0.00833)	-1.32e-05 (4.36e-05)	0.00600*** (0.00194)	0.000446*** (0.000125)	0.0721 (0.0588)	0.0172 (0.0452)
	IBM_SC	- 0.00247*** (0.000776)	-5.39e-06 (4.06e-06)	-3.82e-05 (0.000180)	3.57e-06 (1.17e-05)	0.00537 (0.00548)	0.00962** (0.00421)
	WM_SC	0.000235 (0.000842)	-1.26e-05*** (4.41e-06)	8.68e-05 (0.000196)	1.85e-05 (1.27e-05)	-0.0138** (0.00595)	-0.00992** (0.00457)
	WSize	-1.976*** (0.0882)	-0.000360 (0.000461)	-0.283*** (0.0205)	-0.0105*** (0.00133)	13.50*** (0.623)	13.42*** (0.478)
	LEV	0.118*** (0.0315)	0.000646*** (0.000165)	0.0290*** (0.00734)	0.000607 (0.000474)	-1.302*** (0.223)	-1.223*** (0.171)
	Loan_Ratio	-1.375*** (0.201)	-0.00143 (0.00105)	-0.00731 (0.0468)	-0.0101*** (0.00302)	10.04*** -1.423	4.311*** -1.092
	Constant	23.56*** (0.878)	0.0189*** (0.00459)	3.581*** (0.204)	0.141*** (0.0132)	-127.4*** -6.200	-125.1*** -4.757
	Observations	3,068	3,069	3,068	3,062	3,069	3,071
	Number of ID	317	317	317	317	317	317
<u>OCEANIA</u>	ESG	-0.00948 (0.00584)	-0.000327*** (6.17e-05)	-0.00162*** (0.000388)	-0.000115 (0.000230)	0.0579 (0.0520)	0.0167 (0.0204)
	BS_SCORE	0.0693* (0.0380)	0.000196 (0.000401)	0.00409 (0.00252)	0.00379** (0.00149)	-0.214 (0.338)	-0.299** (0.133)
	IBM_SC	-0.00179 (0.00304)	-3.49e-05 (3.22e-05)	0.000175 (0.000202)	-0.000109 (0.000120)	-0.0122 (0.0271)	0.00673 (0.0106)
	WM_SC	-0.000995 (0.00251)	-5.66e-05** (2.65e-05)	-0.000196 (0.000167)	-0.000143 (9.88e-05)	0.0284 (0.0224)	0.00344 (0.00877)
	WSize	-0.440 (0.494)	-0.0169*** (0.00522)	-0.119*** (0.0328)	-0.0166 (0.0194)	5.019 -4.402	2.397 -1.725
	LEV	0.205* (0.111)	2.47e-05 (0.00118)	0.0108 (0.00740)	0.00378 (0.00438)	-1.185 (0.993)	-0.897** (0.389)
	Loan_Ratio	0.0433 (0.657)	0.00470 (0.00694)	0.0519 (0.0436)	0.00775 (0.0258)	-5.297 -5.853	-2.366 -2.294
	Constant	5.380 -5.118	0.206*** (0.0541)	1.663*** (0.340)	0.164 (0.201)	-34.82 (45.61)	-11.00 (17.88)
	Observations	99	99	99	99	99	99
	Number of ID	10	10	10	10	10	10

**Table 3 : Correlation Matrix**

Variables	PT SD	BIDAS~D	Riskd~y	NON P~L	MP	BV S	ESG	EN PS	SOC PS	GOV PS	BS SC~E	IBM SC	WM SC
WPT_SD	1.0												
WBIDASK_SPRD	-0.1	1.0											
WRiskdensity	0.1	0.1	1.0										
WNON_PERL	-0.1	0.2	0.1	1.0									
Wmp	0.5	-0.2	-0.1	-0.4	1.0								
WBV_S	0.5	-0.2	-0.1	-0.3	0.9	1.0							
WESG	0.0	-0.2	-0.1	0.0	0.1	-0.1	1.0						
WEN_PS	0.0	-0.2	-0.1	0.1	0.1	0.0	0.7	1.0					
wSOC_PS	0.0	-0.2	-0.1	0.1	0.1	-0.1	0.9	0.7	1.0				
WGOV_PS	0.0	-0.2	-0.1	0.0	0.0	0.0	0.7	0.4	0.5	1.0			
WBS_SCORE	0.1	-0.2	0.0	-0.1	0.1	0.1	0.1	0.2	0.1	0.0	1.0		
WIBM_SC	0.1	-0.1	0.0	-0.1	0.1	0.1	0.3	0.2	0.2	0.4	0.0	1.0	
WWM_SC	0.1	0.0	0.0	-0.1	0.2	0.0	0.1	0.0	0.1	0.1	0.0	0.1	1.0
WPROF	-0.1	0.0	0.0	0.0	0.1	-0.1	0.1	0.2	0.1	0.1	0.0	0.0	0.0
WSize	0.0	-0.3	-0.1	0.1	0.1	0.0	0.4	0.5	0.4	0.1	0.2	0.0	-0.1
WLEV	0.1	-0.1	-0.1	0.0	0.1	0.0	0.3	0.3	0.3	0.1	0.1	0.1	-0.1
WLoan_Ratio	0.0	0.1	0.1	-0.2	0.2	0.1	-0.1	-0.1	-0.1	0.0	-0.1	0.1	0.2



**Table 4: VIF For the main regression model**

Variable	VIF	1/VIF
WESG	1.42	0.705417
WSize	1.46	0.684601
WLEV	1.18	0.849134
WIBM_SC	1.13	0.885705
WLoan_Ratio	1.10	0.910224
WWM_SC	1.07	0.931346
WBS_SCORE	1.07	0.932556
WPROF	1.02	0.983254
Mean VIF		1.18

**Table: 5 VIF for the Disaggregated Analysis**

Variable	VIF	1/VIF
WEN_PS	2.60	0.385105
wSOC_PS	2.44	0.409024
WGOV_PS	1.50	0.666020
WSize	1.63	0.614108
WIBM_SC	1.25	0.801180
WLEV	1.20	0.836444
WWM_SC	1.10	0.907859
WLoan_Ratio	1.10	0.909744
WBS_SCORE	1.08	0.927096
WPROF	1.04	0.963402
Mean. Vif		1.49

## **Vita**

Asaad Sendi was born in Madinah, Saudi Arabia. He received his bachelor's degree in business administration in 2017 as well as his MBA from Tennessee State University in 2019. He joined the University of New Orleans in 2019 and earned a PhD and Master of Science in Financial Economics in 2024. His research interest includes corporate leverage, investment, equity investments, and Islamic finance, and asset pricing. During his studies, the author has earned prestigious scholarships from Boeing and Dell.