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UNVEILING THE IMPACT OF ESG DISCLOSURE ON BANK CREDIT GROWTH: A NEW PERSPECTIVE

Aysha Rashed AlHamrani*, Department of Finance and Economics, University of Sharjah, Sharjah city, United Arab Emirates, U20102596@sharjah.ac.ae, ORCID: https://orcid.org/0000-0001-9205-3094

Dr.Atif Awad, Department of Finance and Economics, University of Sharjah, Sharjah city, United Arab Emirates, aawoad@sharjah.ac.ae, ORCID: https://orcid.org/0000-0003-1556-803X

Dr.Mohamed Albaity, Department of Finance and Economics, University of Sharjah, Sharjah city, United Arab Emirates, malbaity@sharjah.ac.ae, ORCID: https://orcid.org/0000-0002-0805-8392

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* Corresponding author

ABSTRACT

This study examined the non-linear relationship between environmental, social, and governance disclosure on bank credit growth in the Middle East and North Africa region. It also investigated whether Islamic banks, GCC banks, and oil-exporting variables affected credit growth. A quantile regression analysis of 394 banks from 11 MENA region countries during 2010-2023 found that the relationship between ESG disclosure and credit growth was an inverted U-shape curve at the lowest quantiles. Then, it became U-shaped at the highest quantiles. The same results showed that for the environmental pillar, the link with credit growth was depicted as an inverted U-shape at the lowest quantiles and then became U-shaped at the highest. However, the relationship between the social and governance pillars and credit growth showed negative and positive effects across all quantiles respectively. Moreover, banks in GCC economies and Islamic banks significantly boosted credit growth. The oil-exporting countries significantly negatively impacted credit growth at the 50^{th} and 75^{th} quantiles, and then the link turned positive on credit growth at the highest quantile. Understanding such relationships will assist bank regulators and policymakers when enforcing specific policies to enhance credit growth in the MENA region's banking sector.

1. INTRODUCTION

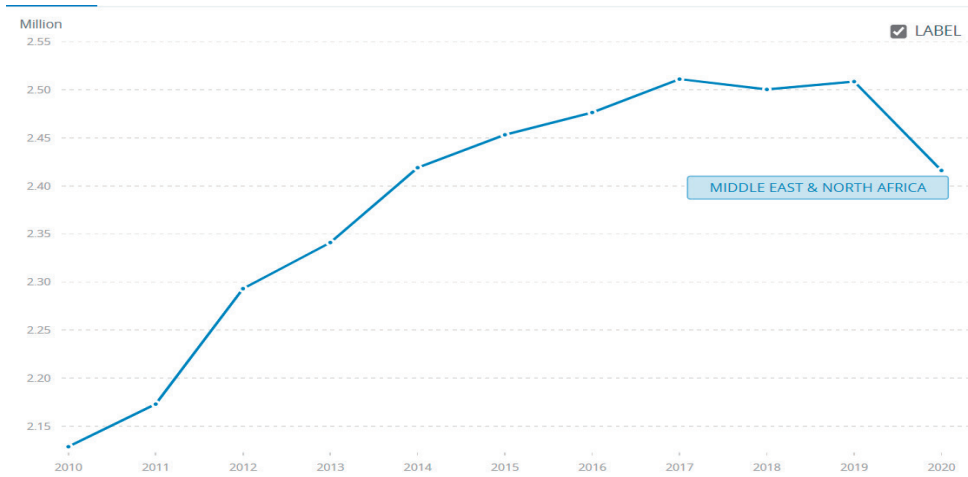
Climate change has been considered a major global challenge, promoting businesses to enforce contingency plans that will help reduce climate change risks (Chen et al., 2022). Businesses have also created sustainable strategies by adapting initiatives and projects related to the environment and society. Companies' annual reports disclose information on practices such as environmental, social, and governance (ESG). During the United Nations Climate Change Conference (COP26) held in Glasgow in 2021, most countries agreed to limit their carbon emissions to a global warming level of 1.5 °C (COP26, 2021). Accompanying the stated target, the COP28 conference in Dubai showed that countries were progressing too slowly toward reducing global warming temperature levels, requiring serious action toward reducing climate change. This situation called on governments to accelerate the conversion of fossil fuel use to renewable energies by 2030 (COP28, 2024).

As regulators require, integrating sustainable finance in the financial sector has led banks to share information regarding their environmental, social, and governance practices in their annual reports (Agnese et al., 2023; Brogi & Lagasio, 2019). Financial institutions' attention to climate change has typically been poor as they have granted loans to environmentally sensitive and polluting industries, indirectly negatively affecting the environment (Fiordelisi et al., 2023). Marsh (2021) states that greenhouse gas emissions are indirectly associated with banks' lending activities.

Such indirect emissions were higher than banks' direct emissions, leading to climate risks. Furthermore, according to the Ernst & Young (EY) MENA ESG Bank tracker report, it was found that the majority of banks in the Middle East and North Africa (MENA) region had not been integrating sustainability factors into their strategies, leading to 20% of the banks applying climate risk policies (Murshid, 2023). The MENA region is one of the areas most exposed to climate change's effects, resulting in higher temperatures, severe water scarcity, and pollution. Hence, the World Bank incorporated climate financing for the MENA region to align with the Paris Agreement at the UN Climate Change Conference (COP21) held in December 2015, reducing climate risks (World Bank, 2023).

The MENA Climate Change Roadmap, which operates from 2021 to 2025, focuses on four areas, including sustainable finance (World Bank, 2023). As shown in Fig.1. The Middle East and North Africa (MENA) region's CO_2 emissions have increased between 2010 and 2019, contributing to about 7% of the global cumulative CO_2 emissions. Despite the MENA region's economies' efforts to mitigate fossil fuel consumption to moderate climate change, the energy intensity and profits generated from oil and gas production compared to the other countries have made it challenging to maintain environmental pollution levels (Bayomi & Fernandez, 2019; Mahmoud, 2023). Fossil fuel usage intensity has been considered a significant indicator of economic development in MENA countries, and it is the primary source of revenue (Tagliapietra, 2019). However, the Middle East and North Africa (MENA) region has enhanced economic development by encouraging private and public sectors to incorporate ESG activities into their strategies (Ullah et al., 2024). In addition, financial regulators and Central Banks in the MENA region have recently focused on introducing mandatory regulations and guidelines for the environmental, social, and governance (ESG) risks by embedding ESG policies into bank strategies to align with the transition of global climate change (Fiordelisi et al., 2023). Financial institutions must align their strategy with ESG issues to achieve climate change objectives (Alexander & Robinson, 2023). For instance, the Central Bank in Bahrain established ESG voluntary disclosure standards in 2020, requiring listed firms to publish their policies (Vanli, 2023). In 2021, the Central Bank of Oman issued a circular to all banks regarding mandatory reports concerning their sustainability compliance (Dimapilis, 2024). Furthermore, according to Article no. 76 of the Chairman of Security and Commodity Authority (SCA), Decision no. (3 R.M) concerning the Corporate Governance Code, it was stated that the firms listed on the Abu Dhabi Securities Exchange (ADX) and Dubai Financial Market (DFM) must mandatorily publish sustainability reports annually (SCA, 2020). Hence, there has been growing attention in the existing literature to evaluate the effect of ESG disclosure in the banking sector after the requirements of the regulatory guidelines that have recently pushed publicly listed firms to disclose ESG reporting (Aracil et al., 2021; Dimapilis, 2024).

Figure 1. CO2 emissions (kt)-Middle East & North Africa. Source: data.worldbank.org



Most prior studies have focused on Corporate Social Responsibility and bank's credit growth (Abdelsalam et al., 2023; Bushman & Williams, 2012; Kim et al., 2010; Zheng et al., 2023), while the effect of ESG disclosure on credit growth in the banking sector has remained under exploration in the existing literature. However, ESG activities in the financial sector have gained the attention of the corporate world, where sustainable initiatives are essential in developing a bank's reputation for clients (Park et al., 2014; Schultz et al., 2013). Moreover, the impact of Islamic banks, GCC banks, and oil-exporting variables on credit growth was examined in this study comprehensively using quantile regression analysis. This examination has provided an in-depth insight into the relationship between variables outside the mean data, resulting in more relevant predictions. Hence, authorities and the public would focus more on banking activities, emphasizing ESG issues and forcing banks to embed such factors in their operations. This will allow them to establish new policies and procedures in the banking sector by examining the factors that positively impact credit growth over the long run.

This study aims to investigate the non-linear effects of ESG components on credit growth. Moreover, the present study also examined whether the Islamic banks, GCC banks, and oil-exporting variables impacted credit growth in the MENA region. Most MENA region share common political, economic, and cultural features (Ismaeel & Zakaria, 2020; Sarhan & Ntim, 2019;), so understanding how environmental reporting practices operate in the MENA region's banking sector broadened the study's scope. Thus, the emerging context of sustainability reporting in the MENA region, especially in the financial industry, has become essential as banks grant loans to local and international organisations. This situation has led banks to ensure that their strategies

and plans complement the sustainable development goals (SDGs) (United Nations Environment Programme).

A sample of 394 banks was examined in the MENA region from 2010 to 2023 using a quantile regression analysis to investigate the study's objectives. The results supported a non-linear relationship between ESG components and credit growth, where there was an inverted U-shaped effect at the lowest (highest) quantiles, which then became U-shaped at the highest quantiles. The same results were shown for the environmental pillar, where the relationship with credit growth was an inverted U-shape at the lowest quantiles, then turned U-shaped at the highest quantile. However, the relationship between the social and governance pillars and credit growth showed negative and positive effects across all quantiles. The analysis also showed that Islamic banks had a positive link with credit growth when comparing the lowest to the highest quantiles. In addition, the results indicated that GCC banks had a significant negative effect at the lowest quantiles and a significant positive impact at the highest quantiles with bank credit growth, suggesting that credit growth is higher in GCC banks than in other banks in the MENA region. Furthermore, the results for oil exporting countries showed a significant negative relationship with credit growth at the 50^{th} and 75^{th} quantiles and a significant positive effect at the highest quantile (90^{th}).

The present paper has provided several significant contributions to the existing literature. First, this study has been the first to examine the impact of Environmental, Social, and Governance (ESG) disclosure on banks' credit growth. Prior studies on this topic have not identified such a relationship, and their findings have been inconclusive. As indicated previously, limited studies have focused on the connection between CSR activities and loan growth (Cooper et al., 2019; Nizam et al., 2019; Zheng et al., 2023), ignoring the influences that ESG disclosure could have on credit growth. Moreover, the curvilinear relationship between ESG components and credit growth has been rarely examined in literature (Barnett & Salomon, 2006; Han et al., 2016; Nollet et al., 2016). Therefore, this study will assist in understanding how ESG reporting affects credit growth in the MENA region's banking sector, enhancing the existing literature.

Moreover, prior studies have focused on examining non-performing loans and credit growth (Vithessonthi, 2016); economic policy uncertainty (Nguyen et al., 2020); economic growth (Ho & Saadaoui, 2022); ownership effects and sentiment (Albaity et al., 2022). Second, the present study has contributed to the existing literature by investigating the impact of Islamic banks, GCC banks, and oil-exporting variables on credit growth in the MENA region. Understanding the role of oil-exporting countries on a bank's credit growth is vital to bank stability in the region's countries since prior studies have not examined such a relationship by combining the three variables into a single comprehensive study framework. Moreover, the banking sector in the MENA region contains both conventional and Islamic banks. Therefore, investigating how these bank types react to improving lending growth is essential. Third, this study has been the first to employ the quantile regression analysis method to analyze the

relationship between ESG and bank credit growth, which is critical to recognizing in-depth insights into such relationships at different quantiles. Thus, enhancing the knowledge of such relationships can enrich the literature by considering different bank credit growth determinants. From a practical perspective, financial regulators and central banks in the MENA region need a clearer insight into the significance of ESG disclosures and banks' credit growth based on the quantile analysis used in this study. Such information will assist them in creating policies and regulations depending on the various levels of banks' credit growth, improving banks' performance in the future. Moreover, the present study's results indicate whether ESG disclosure in the banking industry should be considered a key driver of the country's sustainable economic development. Therefore, this study constitutes theoretical and practical contributions by examining the connections between ESG, Islamic banks, GCC banks, and oil-exporting variables on credit growth in the banking industry.

The remainder of the paper is structured as follows. Section 2 presents a review of relevant existing literature. Section 3 describes the data methodology used in the study. Section 4 presents the study's findings and discussions. Sections 5 and 6 represent the conclusion, policy implications, limitations, and future research.

2. LITERATURE REVIEW

2.1. Theoretical framework.

Understanding how the financial sector operates within an economy when disclosing information related to sustainability practices can help expand the bank's performance. This view is referred to as the Legitimacy Theory. The Legitimacy Theory, first developed by Dowling and Pfeffer in 1975, refers to the social connection between companies and society (Magness, 2006). According to the Legitimacy Theory, banks implement sustainability disclosure to enhance the public's impression, which can increase borrower credibility when requesting a loan. Consequently, firms will have easy access to bank loans when investing in environmental projects. Hence, the banking sector can expand its credit and raise capital when engaging in environmental practices (Akhter et al., 2023; Chowdhury et al., 2020). Such a situation enhances banks' performance and reduces credit risks, which may assist in avoiding liquidity issues during any future crises (Abbas & Ali, 2022; Pham & Nguyen, 2023).

A stakeholder is "any individual or group who can affect or be affected by a company's activities in accomplishing the company's objectives" (Freeman, 1984, p.46). According to the Stakeholder Theory, firms must maintain legitimacy toward internal and external stakeholders by disclosing ESG activities in their annual reports. Such a situation can encourage stakeholders to invest in a company, improving its environmental performance (Alsayegh et al., 2020). Banks engage in ESG practices

to align with stakeholder's interests, which can enhance their performance in the industry. This situation will lead to positive bank reputations, a crucial signal for external stakeholders to assess the company and increase their chances of obtaining credit loans (Stevens et al., 2015). According to Searcy (2016), key stakeholders have varying roles in establishing sustainability indicators and reporting guidelines that can provide reliable information on ESG performance to various stakeholders. Hence, different banks have different ESG performance levels due to differences in reporting standards, levels of legitimacy, and powers enforced by stakeholders (Mitchell et al., 1997; Parmigiani et al., 2011).

Lending is considered one of the investment activities banks use to generate revenue. Hence, banks disclose environmental information to demonstrate that they follow government regulations and to avoid a negative public image within society (Chowdhury et al., 2020). Firms and banks in developed and emerging countries have started to disclose environmental practices in their annual reports to reduce pressure from governments and regulators concerning mitigating climate change effects (Akhter et al., 2023; Gregory et al., 2016; Hahn & Lulfs, 2014). Moreover, environmental disclosures in financial institutions have recently been growing in developing countries, where banks that grant loans to highly polluting firms or those producing unsafe products can increase the indirect impact on social and environmental responsibilities (Hamid, 2004; Sharif & Rashid, 2013). External pressures can lead organisations to disclose sustainability practices to achieve universal climate change objectives. Thus, these rationales allow for the diffusion of environmental practices in organizations' operations in some countries. However, a bank's profitability is considered an essential component of legitimization, primarily when it is regulated by the government (Breton & Côté, 2006). Banks publish environmental information to maintain a positive standing with their stakeholders, attract more loans, and maintain the stability of their country's financial system (Oliveira et al., 2011). Such an outcome is achieved by amending bank practices to comply with society's expectations, which assists in gaining social legitimacy (O'Donovan, 2002). Hence, the disclosure of sustainability information in the MENA region is still developing. Therefore, understanding banks' legitimacy toward sustainability practices is essential in such a context.

2.2. Environmental, social, and governance (ESG) and bank credit growth

Three pillars, environmental, social, and governance (ESG), have been defined as follows: a) environmental indicators refer to environmental activities such as climate change, pollution controls, and clean energy practices; b) social indicators pertain to aspects related to the well-being of employees, society, and stakeholders; c) governance indicators pertain to aspects of corporate governance related to ethics

and values (Husted & Sousa-Filho, 2017). Recently, banks have started prioritizing ESG disclosure in their annual reports since it is essential to determine the connection between ESG activities and lending activities. This situation assists in segregating funds into sustainable investments, satisfying creditors' preferences. Therefore, banks' engagement in ESG practices will help attract creditworthy debtors (Herboln et al., 2019; Wu & Shen, 2013).

Studies regarding ESG and bank credit growth are still emerging and have received greater attention from finance scholars. Prior studies have focused only on ESG or CSR activities and bank performance (Azmi et al., 2021; El-Khoury et al., 2023), bank risk (Chiaramonte et al., 2022; Di-Tommasco & Thorton, 2020), profitability (Menicucci & Paolucci, 2023), bank value (Azmi et al., 2021; Finger et al., 2018). Regarding banking performance and value, it has been found that ESG activities promote banking performance until a certain point. After that, banking performance starts to decline in terms of ESG activities. Consequently, bank value positively increased with a low level of ESG activities using a sample of 44 emerging economies from 2011-2017 (Azmi et al., 2021). Chiaramonte et al. (2022) conducted a study using a sample of European banks from 2005-2017, and it was found that banks with higher ESG ratings were less risky during a financial crisis. In addition, a prior study found a negative relationship between ESG activities and bank profitability as costs increased when implementing ESG practices using a sample from 51 countries from 2006-2021 (Yuen et al., 2022). Hence, few studies have shed light on sustainability activities and bank credit growth. However, according to Bushman & Williams (2012), well-known banks that engage in CSR activities result in high loan quality. Consumers favor banks with strong CSR programs despite the interest rates offered for their loans (Kim et al., 2010). In addition, banks with strong ESG scores can foster market and stakeholder trust, enhancing their competitive advantages. This outcome strengthens their ability to offer loans unaffected by economic variations (Abdelsalam et al., 2023; Ayadi et al., 2010). Zheng et al. (2023) stated that CSR activities increased deposits and loan growth. According to Matuszak & Różańska (2019), it has been found that there are both U-shaped and inverted U-shaped relationships between CSR disclosure and financial performance. Therefore, limited knowledge of the relationship between ESG reporting and credit growth is known, so the present study has filled the gap in existing literature. Hence, the following hypothesis was formulated:

H_1: There is a non-linear relationship between ESG disclosure and the bank's credit growth.

2.3. Other factors affecting bank credit growth.

Oil production has been the primary economic supplier to MENA region countries, representing around 31% of the world's oil production (Keltie, 2022). This situation has led the region to have one of the world's highest levels of carbon emissions. Recently,

the MENA region countries have focused on decreasing their oil consumption and transferring toward clean energy resources through promoting green projects (Keskes & Haytayan, 2023). Furthermore, fossil fuel subsidies have resulted in significant economic losses since domestic oil resources are only sold on a small portion of their global market value due to the competitiveness of renewable energy resources worldwide (Tagliapietra, 2019). The economic structure of net oil-exporting nations indicates that the banking sector's intermediation activities are impacted by the operations of large firms in the oil and gas industry (Kurronen, 2015).

According to Bruckner et al. (2012), an increase in oil price returns would positively impact a country's economy, especially for oil-exporting countries. Such a situation will lead to growth in GDP in those countries, which will boost investments, making it easier to obtain bank loans. In addition, the growth in oil prices has a notable impact on bank credit risk; specifically, higher oil prices are linked to a decrease in nonperforming loans, enhancing loan growth, while lower oil prices correspond to an increase in nonperforming loans, affecting negatively loan growth (Wang & Luo, 2020). Therefore, oil revenues can provide significant liquidity to the banking sector, leading to increased credit growth. The volatility of oil prices and the potential for financial mismanagement pose credit risks. However, a drop in oil prices will have an unfavorable impact on a firm's financial position, making it challenging to repay bank loans and raising the prospect of non-performing loans (NPLs) (Al-Khazali & Mirzaei, 2017).

Furthermore, banks with different characteristics react differently to oil price fluctuations. Conventional and smaller banks with low liquidity that depend heavily on customer deposits for funding are more susceptible to the negative effects of falling oil prices. Additionally, banks in major oil-exporting countries, as well as those in nations with less developed financial sectors and lacking explicit deposit insurance, experience greater deterioration in asset quality during periods of declining oil prices (Wang & Luo, 2020). Hence, the relationship between oil exports and credit growth is complex and multifaceted, so analyzing such a relationship enhances existing literature.

The conventional and Islamic financial systems differ from one another in several ways. Islamic banks comply with Islamic laws (Shariah) (Ibrahim & Rizvi, 2018) where their loan growth methods are due to non-profit and loss-sharing contracts (non-PLS), which represent 80% of banks' total assets (Abedifar et al., 2013; Khan, 2010). However, conventional bank loan growth comes from the interest rates provided to the borrowers. Conventional banks are more stable than Islamic ones since they focus on stable investments, leading to efficient performance (Mobarek & Kalonov, 2014). However, different banks started to seize opportunities to diversify their loan portfolios by expanding to new geographical areas, leading to lower interest rates and higher bank performance (Lepetit et al., 2008; Rossi et al., 2009). A prior study found that the relationship between non-performing loans and bank credit growth exhibited a pattern depending on the type of bank (Tölö & Virén, 2021). Albaity et al. (2022)

found that Islamic banks performed better than conventional banks, indicating that Islamic regulations enhance the financial system, especially regarding credit growth. According to Abedifar et al. (2013), Islamic banks exhibit more stable credit growth than conventional banks, particularly in financial distress. The study attributes this stability to the risk-sharing and asset-backed nature of Islamic financing. The presence of Islamic banks enhances profitability and improves the Islamic banking system's lending and deposit growth, contributing to stability via asset and liability channels (Rizvi et al., 2020).

Moreover, Islamic banks maintain efficient loan growth despite the absence of interest-based lending. This is due to the PLS contracts (Srairi, 2010). Hence, the literature indicates that Islamic banks generally contribute positively to bank loan growth, characterized by stability and resilience. Their unique operational principles, ethical guidelines, and risk-sharing mechanisms foster a more prudent and sustainable credit growth environment.

Bank credit growth varies by region. If a given market has good economic growth, access to bank loans can be easier, resulting in higher bank loan performance (Kärnä & Stephan, 2022). Each region has unique political and economic circumstances with different expected results. Moreover, regulations and laws vary across regions, which might affect bank lending activities (Abbas & Ali, 2022). It was found that bank capital had less influence on the relationship between credit growth and credit risk across different regions (Abbas & Ali, 2022). According to Albaity et al. (2022), GCC banks experience higher credit growth due to higher economic growth.

Moreover, GCC is highly reliant on the energy sector, so the volatility in energy prices might affect the financial development of those countries (Al-Hassan et al., 2010). GCC banks positively impact credit growth due to the trustworthiness and confidence of borrowers (Albaity et al., 2023a). Despite numerous studies on the growth of bank lending activities, few studies have addressed the relationship between bank type, GCC banks, and whether the country was oil-exporting on credit growth in the MENA region using a comprehensive framework that combines the three variables to examine their effects on credit growth (Abbas & Ali, 2022; Albaity et al., 2022; Tagliapietra, 2019). Hence, examining such relationships has filled the gap in the current literature. Thus, the following hypotheses were formulated:

H_2: A positive relationship exists between Islamic banks and bank credit growth.

H_3: A relationship exists between GCC banks and bank credit growth.

H_4: A positive relationship exists between oil export countries and banks' credit growth.

3. METHODOLOGY

3.1. Sample Selection

Secondary data were collected from various sources to create the study's sample. Bank data, such as "Credit growth," "Lagged deposits," "Solvency," "Equity," and "Bank size," were obtained from the Bank Focus Database. The annual ESG data was obtained from the Bloomberg Database. The "Gross Domestic Product," "Inflation," and "Oil rent" data were extracted from the World Development Indicator Database. The present study's final sample consisted of 394 conventional and Islamic banks in 11 MENA region countries, with data spanning from 2010 to 2023. The sample countries comprised the United Arab Emirates, Bahrain, Saudi Arabia, Israel, Jordan, Kuwait, Lebanon, Morocco, Oman, Malta, and Qatar. The MENA region was chosen as the present study's sample data based on the region's recent regulatory requirements for disclosing ESG components when publishing annual reports in the financial markets (Agnese et al., 2023; Brogi & Lagasio, 2019). Furthermore, the emerging context of sustainability reporting in the MENA region's banking sector has been essential since banks grant loans to local and international organisations where ESG reporting is essential globally. Rapid development in the financial sector concerning higher investments, energy resources, and trade openness (Naceur et al., 2014) made the MENA region's countries an ideal context for examining the impact of ESG disclosure on credit growth. Banks with missing data were excluded from the study, resulting in 394 banks. The definitions of the variables and data sources are presented in Table 1 below. The study's model is displayed below:

$$CG_{i,j,t} = \beta_0 + \beta_1 ESG_{j,t} + \beta_2 ESG_{j,t}^2 + \beta_3 Size_{i,j,t} + \beta_4 LAGDEP_{i,j,t} + \beta_5 IS_{i,j,t} + \beta_6 SOL_{i,j,t} + \beta_7 EQ_{i,j,t} + \beta_8 \Delta GDP_{j,t} + \beta_9 INF_{j,t} + \beta_{10} OR_{j,t} + \varepsilon_{i,j,t} \quad (1)$$

Where β_0 is the constant; $CG_{i,j,t}$ is bank credit growth and its one-year lagged value of bank *i* in country *j* during year *t*. $ESG_{j,t}$ is the combined environmental, social, and governance score, along with each pillar included separately in the model, while $ESG_{j,t}^2$ is the square of the non-linear ESG components in country *j* during year *t*. *Size* is bank size, *LAGDEP* is the one-year lag of deposits, *IS* is the bank type dummy variable where 1 denotes an Islamic bank and 0 otherwise, *SOL* is the solvency rate, *EQ* is the bank's equity, ΔGDP is the growth rate of the GDP, *INF* is the country's inflation rate, and *OR* is the country's oil rent rate. $\varepsilon_{i,j,t}$ represents the error term.

Table 1. Definition of the variables and data sources.

Variable	Description	Data Source
CG	Growth rate of net loans over the GDP deflator (%)	Bank Focus
ESG	Environmental, Social, and Governance (score from 0 to 100)	Bloomberg
DEP	Lagged value of total customer deposits over total liabilities (%)	Bank Focus
SOL	Total liability over total assets (%)	Bank Focus
EQ	Growth rate of equity over the GDP deflator (%)	Bank Focus
Size	Total assets (USD)	Bank Focus
GDP	GDP growth (annual %)	WDI
INF	Inflation, consumer prices (annual %)	WDI
OR	Oil rents (% of GDP)	WDI
Notes: WDI denotes the World Bank's World Development Indicator		

3.2. Measurement of variables

3.2.1. Dependent variable

The dependent variable in the present study was bank credit growth, which was introduced in the study model. Following (Albaity et al., 2022; Albaity et al., 2023; Allen et al., 2015; Bertay et al., 2015; De Haas & Van Lelyveld, 2014; Ibrahim, 2016), lagged bank credit growth was calculated as the growth of total loans over GDP deflator. Lagged bank credit growth was implemented to capture the dynamic trends of bank credit growth. This situation indicated whether lending during the prior period fostered bank credit growth in the following years, leading to a sustainable financial system. Hence, this approach required applying a system generalized method of moments (GMM) regression estimator, which handled the dynamic panel data models that used lagged values as variable instruments (Ibrahim, 2016; Iwanicz-Drozdowska & Witkowski, 2016).

3.2.2. Independent variables

The independent variable in this study was the ESG components, which were measured using the environmental, social, and governance pillars along with the combined three pillars. It offered an in-depth score of a bank's overall ESG performance per prior studies (Buallay et al., 2021; Deng et al., 2023; Mallek et al., 2024; Shakil et al., 2019). The ESG pillar scores were obtained from the Bloomberg database, derived from banks' annual

reports and other sources. The ESG score (0 to 100) included 120 indicators across the three dimensions (Mallek et al., 2024; Wong et al., 2021). The environmental pillar score included various indicators such as air quality, exposure to climate, waste management, energy management, and greenhouse gas emissions management. The social pillar score included various indicators such as employment policies, ethics, community rights, product quality, and risk management. The governance pillar score comprised multiple indicators such as the board of directors' composition, auditing and oversight, and shareholder rights.

3.2.3. Control variables

The control variables for this study contain a range of bank-specific and country-specific variables. The bank-specific variables included bank size, lagged deposits, solvency, and equity. The natural logarithm of total assets measured bank size. Prior studies found a negative association between bank size and bank credit growth since larger banks had a smaller loan portfolio decrease than smaller banks (Amador et al., 2013; Bertay et al., 2015; Ibrahim, 2016). This situation will lead to lower non-performing loans due to the diversification in lending activities (Wu et al., 2022).

Lagged deposits were measured using total customer deposits over total liabilities. A positive relationship exists between deposits and loan growth since banks rely on deposits to diversify their loans during a healthy economy (Bertay et al., 2015; Ibrahim, 2016). Nevertheless, some studies have found a detrimental effect, demonstrating that banks mitigate their loans due to excess customer deposits (Berrospine & Edge, 2010; Cucinelli, 2016).

Solvency was measured using total liabilities over total assets. Bank solvency decreases if banks use newly issued debt to provide loans (Allen et al., 2017). On the other hand, a bank can enhance its credit growth by issuing new equity, which helps diversify investments and improves bank solvency (De Haas & Van Lelyveld, 2010; Zins & Weill, 2018).

Equity was measured using the equity growth rate over the GDP deflator, an indicator of bank capitalisation. Prior studies have found a positive impact between bank capital and credit growth since capitalisation attracts creditworthy borrowers to extend loans (Brei et al., 2013; De Haas & Van Lelyveld, 2006; Gambacorta & Mistrulli, 2004).

The country-specific variables included the GDP, inflation rate, and oil rent. Gross domestic product growth rate was extracted from the World Bank's World Development Indicator database. It has been found that the GDP has positively impacted bank credit growth during a thriving economy, while during the economic downturn, a negative effect denotes that banks mitigate their lending activities (Albaity et al., 2021; Ibrahim, 2016).

Inflation data was collected from the World Bank's World Development Indicator database. Prior studies have found a negative relationship between inflation and bank credit growth, as when the inflation rate is higher, creditors' ability to repay their debts declines, causing banks to place restrictions on granting loans (Cucinelli, 2016).

Oil rent data were extracted from the World Bank's World Bank Development Indicator database, which measures "the value of oil production at world prices minus the total costs of its production" (Gozgor et al., 2019; World Bank, n.a). Prior studies have found that oil rents positively impacted GDP growth, especially in oil-exporting countries (Aimer, 2018; Demir & Danisman, 2021; Mahmah & Kandil, 2019). This situation leads to economic and bank credit growth (Albaity et al., 2020; Ibrahim, 2016).

3.2.3.1. Islamic banks, GCC banks, and oil-exporting variables

The present study compared Islamic and conventional and GCC banks and whether countries were oil-exporting regarding bank loan behavior. The regression model included a dummy variable to determine whether Islamic banks' credit growth was superior to conventional banks (Albaity et al., 2023). It has been found that the Profit and Loss Sharing Mechanism has led Islamic banks to grant excess loans due to the lower withdrawal of deposits (Bourkhis & Nabi, 2015; Farooq & Zaheer, 2015).

The GCC banks included dummy variables in the regression model to understand whether GCC banks exhibited unique characteristics toward credit growth compared to non-GCC MENA region banks. The variable for GCC banks equaled one and was 0 for non-GCC banks. Albaity et al. (2022) found that credit growth was higher in GCC banks during economic growth due to higher oil prices.

The oil-exporting included a dummy variable in the regression model where oil-exporting countries are indicated as 1 and 0 otherwise. Oil exporting can positively or negatively influence bank credit growth, especially for oil-exporting and oil-importing countries. Oil revenues encourage governments to spend more on non-oil areas, increasing investment opportunities and, consequently, increasing banks' loans (Albaity et al., (2022).

3.2.3.2. Method of Analysis

The present study employed the quantile regression method to analyse the non-linear relationship between ESG reporting and bank credit growth and the other variables across the five quantiles (10, 25, 50, 75, and 90 percent). This approach was introduced by (Koenker and Bassett, 1978) to examine the heterogenous effects between explanatory variables and dependent variables during a time-varying period (Jawadi et al., 2017). The main benefit of this approach has been the robustness of the outliers

and heavy-tailed distributions (Buchinski, 1994; Koenker & Bassett, 1978). Its ability to estimate the slope effects at different percentage points (quantiles), which describe the entire distribution of the dependent variable, has been another noteworthy feature (Dimelis et al., 2017). Even with extra control variables, this approach has been exceptional in generating unconditional quantile treatment effects on treatment and control variables (Mallek et al., 2024). Hence, the present study implemented the instrumental variable (IV) quantile regression method (GQR), which is more resistant to outliers when handling endogeneity problems (Bruna et al., 2021). Using the conditional outcome distribution estimates covariate effects that impact the center and tail distribution. Consequently, instruments can be used to address and control endogeneity (Bruna et al., 2021). The model is specified as below:

$$CR_{i,j,t} = \gamma_\tau X'_{j,t} + \varepsilon_{i,t} \tag{2}$$

$$Q_\tau\left(CR_{i,j,t}\middle|X_{i,t}\right) = \gamma_\tau X'_{j,t} \tag{3}$$

where X' is the vector of the regressors as specified in Equation (1), ε is the vector of the residuals; $Q_\tau\left(CR_{i,j,t}\middle|X_{i,t}\right)$ is the τ^{th} conditional quantile of $CR_{i,j,t}$ given X, where the quantiles are 10^{th}, 25^{th},50^{th},75^{th}, and 90^{th} percentile.

4. RESULTS AND DISCUSSION

4.1. Descriptive Statistics

Table 2 displays the descriptive statistics of banks operating in the MENA region. The mean of bank credit growth was positive at 0.1% for the sample period. Mean of the combined ESG reporting showed a score of 27. Moreover, lagged deposits, solvency, equity, and bank size showed mean values of 0.81, 0.87, 0.001, and 17, respectively. Regarding the macroeconomic variables, the means of the GDP, inflation rate, and oil rent scores were 3.1, 3.3, and 20, respectively.

Table 2. Descriptive statistics for the entire sample

Stats.	CG1	CG2	ESG	DEP	SOL	EQ	Size	GDP	INF	OR
Mean	0.0007	0.0007	26.9942	0.8052	0.8733	0.0007	17.0610	3.0481	3.3328	19.6897
Std. Dev	0.0013	0.0013	12.5304	0.0904	0.0409	0.0014	1.0859	4.3718	14.2639	16.6644
Min	-0.0028	-0.0026	3.2592	0.5818	0.4143	-0.0055	13.5075	-21.3999	-3.7492	0.0000
Max	0.0142	0.0143	73.7049	0.9892	0.9600	0.0138	19.6391	19.5923	171.2055	58.3689

Table 3 reports the descriptive statistics of all variables for the 11 countries in the MENA region. The mean value of bank credit growth was highest for Qatar (0.0014)

and lowest for Lebanon (0.0001). ESG reporting showed the highest mean value for Israel (45.7) and the lowest for Kuwait (19.3). Regarding bank-specific variables, such as deposits, the highest value was in Malta (0.890), and the lowest was in Kuwait (0.728). Solvency showed the highest mean value in Israel (0.934) and the lowest in Saudi Arabia (0.846). Equity showed the highest mean value in Oman (0.0011) and the lowest in Lebanon (0.0001). Bank size showed the highest mean value in Israel (18.21) and the lowest in Malta (15.37). Regarding the macroeconomic variables, the GDP showed the highest mean value in Malta (5.59) and the lowest in Lebanon (-1.38). Inflation showed the highest mean value in Lebanon (34) and the lowest in Israel (1.27). Oil rent showed the highest mean value in Kuwait (44.3) and the lowest in Lebanon and Malta (0).

Table 3. Descriptive statistics by country

Country	Variables	CG	ESG	DEP	SOL	EQ	Size	GDP	INF	OR
Bahrain	Mean	0.0005	31.3000	0.7740	0.8741	0.0007	16.4359	2.8701	1.5449	13.8174
	Std. Dev.	0.0014	5.8605	0.0717	0.0192	0.0007	0.6764	2.4580	1.6822	5.6871
Israel	Mean	0.0007	45.7262	0.8255	0.9340	0.0008	18.2108	4.2500	1.2266	0.0074
	Std. Dev.	0.0009	15.0971	0.0255	0.0084	0.0009	0.4404	2.3983	1.5233	0.0033
Jordan	Mean	0.0004	37.0865	0.7706	0.8610	0.0003	16.4620	2.2378	2.6191	0.0023
	Std. Dev.	0.0008	10.5957	0.0458	0.0316	0.0004	1.3236	1.1125	2.1246	0.0038
Kuwait	Mean	0.0006	19.2794	0.7281	0.8709	0.0006	17.0181	1.3366	2.9204	44.2897
	Std. Dev.	0.0010	9.8291	0.0954	0.0234	0.0016	0.7797	4.9589	1.1878	10.4821
Lebanon	Mean	0.0001	23.0202	0.8574	0.9079	0.0001	17.0778	-1.3801	33.9930	0.0000
	Std. Dev.	0.0012	12.7197	0.0658	0.0223	0.0008	0.3622	7.4056	60.4191	0.0000
Malta	Mean	0.0002	27.0358	0.8897	0.9109	0.0004	15.3687	5.5927	1.7341	0.0000
	Std. Dev.	0.0010	4.2780	0.0701	0.0265	0.0010	1.1007	5.0306	1.4644	0.0000
Morocco	Mean	0.0004	24.5560	0.7672	0.8969	0.0006	17.5724	2.8392	1.5639	0.0029
	Std. Dev.	0.0008	11.2625	0.0641	0.0062	0.0008	0.2380	3.4834	1.5799	0.0022
Oman	Mean	0.0010	24.5151	0.8834	0.8602	0.0011	15.7481	2.6570	1.5043	26.3737
	Std. Dev.	0.0031	5.0511	0.0586	0.0166	0.0030	0.4062	3.1026	1.3871	8.6289
Qatar	Mean	0.0014	24.8874	0.7840	0.8615	0.0010	17.4807	4.5469	1.2949	18.8493
	Std. Dev.	0.0014	11.8224	0.0751	0.0268	0.0014	1.0763	5.9074	2.1725	6.8439
Saudi Arabia	Mean	0.0010	27.2738	0.8766	0.8457	0.0007	17.3956	3.6602	2.4296	31.5757
	Std. Dev.	0.0010	8.7661	0.0565	0.0585	0.0007	0.6930	3.6839	2.0790	11.1179
UAE	Mean	0.0008	25.4730	0.7744	0.8666	0.0008	17.2863	3.2014	1.3378	18.6806
	Std. Dev.	0.0011	13.7714	0.0802	0.0304	0.0017	1.0936	3.2941	1.9549	6.2433

Notes: CG is credit growth, ESG is the environmental, social, and governance score, DEP is the lagged value of total customer deposits over total liabilities, SOL is total liabilities over total assets, EQ is the growth rate of equity, Size is the natural logarithm of total assets, GDP is the growth rate of the GDP, INF is the inflation rate, and OR is the oil rent.

4.2. Results

The results of the non-linear relationship model of ESG and bank credit growth are shown in Tables 4 and 5. As shown in Table 4, the relationship started to be significantly positive from the 10^{th} quantile to the median quantile and then began to be significantly negative at the (75^{th} and 90^{th}) quantiles. This outcome supported the non-linear relationship between ESG and bank credit growth, where the link depicted an inverted U-shape and became U-shaped at the highest quantiles, supporting H_1. This finding supported the prior studies by Barnett & Salomon (2006), Matuszak & Różańska (2019), and Nollet et al. (2016), which indicates that there are both U-shaped and inverted U-shaped relationships between CSR disclosure and financial performance. This implies that the highest and lowest levels of ESG are related to the lowest level of credit growth due to slight ignorance of ESG indicators for some banks in the MENA region (Barnett & Salomon, 2006). Moreover, it has been found that there is a significant negative relationship between ESG and bank credit growth, which suggests that the engagement to invest in ESG activities requires banks to increase their spending to achieve social and environmental objectives and increase their profitability. As a result, banks incur higher costs and experience lower profitability (Di-Tommaso & Thornton, 2020; Galant & Cadez, 2017).

The results for the control variables are shown in Table 4. Lagged deposits and equity significantly and positively impacted bank credit growth at all quantile levels. This outcome implied that banks primarily rely on deposits to allocate loans, which is considered a primary source of financing (Bertay et al., 2015; Ibrahim, 2016). Regarding bank solvency, the results showed a significant positive impact on bank credit growth at the 50^{th} quantile and a significant negative relationship at the 90^{th} quantile. This outcome indicated that increased bank loans can increase banks' solvency until a specific time. After that, the rapid growth in bank lending activities will lower banks' solvency during the long-term period (Bhowmik & Sarker, 2021; Kashif et al., 2016). The coefficient of bank size showed a positive and significant relationship with bank credit growth across the lowest and median quantiles except at the 75^{th} quantile, which showed a non-significant result. At the 90^{th} quantile, bank size negatively and significantly impacted credit growth. This outcome indicates that larger banks may invest in riskier assets and expand into more business lines to improve their credit growth in the first three quantiles. The result aligned with the prior studies by Ho et al. (2021) and Le et al. (2019). Afterward, the larger banks had lower growth credit at the highest quantiles as they started to engage more in non-intermediary activities (Albaity et al., 2022; Aysan & Ozturk, 2018).

In addition, the inflation rate negatively and significantly impacted bank credit growth, indicating that an increase in the rate reduced bank credit growth, which aligned with Albaity et al. (2022). The GDP growth rate had a significant negative relationship with bank credit growth. This outcome suggested that bank's credit growth will be lower when there is higher economic growth since firms could find it

easier to obtain funding from other sources during economic expansions. The results demonstrated countercyclical bank credit growth in the MENA region. The finding supported prior studies by AlBaity et al. (2023a). However, the coefficients of oil rents showed a significant positive impact on bank credit growth across all quantiles, indicating that higher oil rents will lead to lower economic growth. Higher oil rents imply a higher degree of natural oil resource rent in a specific country (Ofori-Sasu et al., 2023), which affects the development of the banking sector due to the oil curse hypothesis. The oil curse hypothesis refers to oil-rich countries' failure to benefit from their natural resources' wealth as they focus more on public welfare needs (Sachs & Warner, 1995). This finding supported prior studies by Elhannani et al. (2016) and Ofori-Sasu et al. (2023). Hence, the overall results are presented graphically in Fig.2 so that the findings in Table 4 can be comprehended easily.

Table 4. Non-linear impact of ESG on bank credit growth

Variables	10th	25th	50th	75th	90th
LCG	0.0131	0.0686***	0.1022***	0.1159***	0.0556***
	(-0.01067)	(-0.0117)	(-0.0109)	(-0.0181)	(-0.0085)
ESG	0.00002***	-0.00002***	0.0000	-0.00003***	-0.00002***
	(0)	(0)	(0)	(0)	(0)
ESG2	-0.0000***	0.0000***	0.0000	0.0000***	0.0000***
	(0)	(0)	(0)	(0)	(0)
LDEP	0.0005***	0.0002**	0.0012***	0.0017***	0.0028***
	(-0.0001)	(-0.0001)	(-0.0001)	(-0.0001)	(-0.0001)
SOL	-0.0003	0.0004	0.0016***	0.0007	-0.0026***
	(-0.0003)	(-0.0003)	(-0.0005)	(-0.0005)	(-0.0006)
EQ	0.3377***	0.4620***	0.5121***	0.5696***	0.7661***
	(-0.0184)	(-0.0105)	(-0.0154)	(-0.0271)	(-0.0129)
Size	0.0002***	0.0001***	0.0001*	0.0000	-0.0002***
	(0)	(0)	(0)	(0)	(0)
GDP	0.00002***	0.00001***	-0.00002***	-0.00002***	-0.00001***
	(0)	(0)	(0)	(0)	(0)
INF	-0.00001***	-0.00001***	-0.00000**	-0.00000***	-0.00001***
	(0)	(0)	(0)	(0)	(0)
OR	0.00001***	0.00000***	0.00001***	0.00001***	0.00001***
	(0)	(0)	(0)	(0)	(0)
Year	0.0000	0.00002**	0.0000	0.00003***	0.00005***
	(0)	(0)	(0)	(0)	(0)
Constant	-0.0081	-0.0339***	-0.0017	-0.0612***	-0.0955***
	(-0.0135)	(-0.0127)	(-0.0287)	(-0.0105)	(-0.0063)
Observations	394	394	394	394	394

Notes: Standard errors are shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1

As shown in Table 5, the dummy variable for Islamic banks had a positive link with bank credit growth when moving from the lowest to the highest quantiles. This outcome indicated that Islamic banks had higher credit growth than conventional banks, supporting hypothesis H_2. This finding aligned with Abedifar et al. (2013) and Mollah et al. (2017), which indicated that Islamic banks had higher financial stability and improved performance due to their non-profit and loss sharing (PLS) contracts and higher capitalization. Regarding the dummy variable for GCC banks, at the lowest quantile, credit growth was low in GCC banks. At the median and highest quantiles, the increased credit growth was higher in GCC banks than in other non-GCC banks in the MENA region, supporting hypothesis H_3. This finding was in line with Albaity et al. (2023a), Al-Khouri & Arouri (2016), and Muhammad et al. (2016), which indicated that the GCC banking sector demonstrated the highest amount of profitability and credit growth. Government ownership had the largest share in the GCC banking sector, depositing their country's foreign reserves in regular banks, enhancing the GCC region's lending growth (Al-Hassan et al., 2020). According to Sturn et al. (2008), GCC financial institutions experience a rise in revenue diversification due to the dynamic increase in personal loans. The results showed a negative relationship with bank credit growth at the (50th and 75^{th}) quantiles regarding the dummy variable for oil exporting. This outcome indicates that oil price movements heavily affected oil-exporting economies since crude oil is considered one of those countries' primary revenue sources. Oil-exporting countries experienced a revenue surplus due to increasing oil prices, which boosts economic growth (GDP). Thus, increased GDP negatively affected credit growth, as explained previously. This finding aligned with prior studies by AlBaity et al. (2023b) and Al-Khazali & Mirzaei (2017). However, the influence of oil-exporting on credit growth turned out to be positive at the highest quantile (90^{th}), which indicated an increase in the oil prices that could lead to higher deposits in the financial institutions, enhancing bank credit growth in the long run, partially supporting H_4. This finding was consistent with prior studies by Alodayni (2016), Moshiri (2015), and Nwani, (2017). Hence, the overall results are presented graphically in Fig.3 so that the findings in Table 5 can be comprehended easily.

Table 5. Non-linear impact of other factors on bank credit growth

Variables	10th	25th	50th	75th	90th
LCG	0.03204***	0.08723***	0.11309***	0.04551***	0.06193***
	(0.00217)	(0.00624)	(0.01005)	(0.00622)	(0.01856)
ESG	0.00002***	-0.00002***	-0.00001	-0.00001**	-0.00001***
	(0.00000)	(0.00000)	(0.00001)	(0.00001)	(0.00000)
ESG2	-0.00000***	0.00000***	0.00000	0.00000***	0.00000***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
LDEP	0.00068***	0.00021	0.00083***	0.00141***	0.00114***
	(0.00002)	(0.00021)	(0.00016)	(0.00016)	(0.00021)
SOL	-0.00025***	-0.00018	0.00278***	0.00120***	-0.00163***
	(0.00005)	(0.00038)	(0.00053)	(0.00043)	(0.00040)
EQ	0.38082***	0.43702***	0.53113***	0.59614***	0.79035***
	(0.00129)	(0.01008)	(0.00630)	(0.01517)	(0.01954)
Size	0.00014***	0.00011***	0.00002	0.00002	-0.00013***
	(0.00000)	(0.00002)	(0.00002)	(0.00002)	(0.00001)
GDP	0.00001***	0.00001	-0.00001	-0.00001***	-0.00000
	(0.00000)	(0.00001)	(0.00001)	(0.00000)	(0.00000)
INF	-0.00001***	-0.00001***	-0.00001***	-0.00000***	-0.00000***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
OR	0.00001***	0.00000***	0.00001***	0.00001***	-0.00002***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Year	-0.00000***	0.00000	0.00002*	0.00004***	-0.00005***
	(0.00000)	(0.00001)	(0.00001)	(0.00001)	(0.00000)
Dummy_ Islamic	-0.00004***	0.00020***	0.00035***	0.00057***	0.00045***
	(0.00000)	(0.00004)	(0.00005)	(0.00002)	(0.00002)
Dummy_GCC	-0.00015***	-0.00007	0.00021**	0.00017***	0.00092***
	(0.00000)	(0.00005)	(0.00009)	(0.00004)	(0.00005)
Dummy_Oil_ Exp	-0.00000	-0.00001	-0.00026***	-0.00025***	0.00013***
	(0.00001)	(0.00004)	(0.00004)	(0.00005)	(0.00004)
Constant	0.00060	-0.00965	-0.04217*	-0.07917***	0.09623***
	(0.00119)	(0.01039)	(0.02212)	(0.01809)	(0.00769)
Observations	394	394	394	394	394

Notes: Standard errors are shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The results in Table 6 represent the impact of the three ESG components on bank credit growth. Firstly, the results regarding the environmental component of ESG showed similar findings as those in Table 5. However, the result indicated a significant and negative relationship between the social component of ESG and bank credit growth at the lowest quantiles (10^{th} and 25^{th}) and the highest quantiles (75^{th} and 90^{th}). Moreover, the result showed a significant negative impact between bank solvency and credit growth at the lowest and highest quantiles. This finding was consistent with the prior studies by Messai & Jouini, 2013; Wu & Shen (2013), which indicated that social sustainability initiatives could negatively impact a bank's financial performance. This might be due to the increase in bad loan growth. Regarding the relationship between the governance component and bank credit growth, the result indicated a significant positive impact on bank credit growth across all quantiles. This finding aligned with the previous studies by Andries & Brown (2017) and Fiador & Sarpong-Kumankoma (2021), which indicated that corporate governance enhances loan quality, leading to higher bank loan growth. In addition, the GDP also showed a significant positive link between the GDP and bank credit growth at the first two quantiles (10^{th} and 25^{th}) and the highest quantile (90^{th}). This finding supported the prior studies by Albaity et al. (2021) and Ibrahim (2016), which found that a higher GDP rate led to economic growth, increasing bank credit growth. In addition, the results in Table 7 showed the impact of the three ESG components on bank credit growth when including the dummy variables. The results were similar to the findings in Table 5 except for the oil-exporting variable in the Environmental pillar's effect on credit growth, which showed a significant positive impact on bank credit growth at the lowest quantile (10^{th}). Hence, the overall results in Tables 6 and 7 are presented graphically in Appendix 2.

Table 6. Non-linear impact of each ESG component on bank credit growth

Variables	10th	25th	50th	75th	90th	10th	25th	50th	75th	90th	10th	25th	50th	75th	90th
LCG	0.0117	0.0420*	0.1043***	0.1031***	0.0075	0.0371*	0.05424***	0.1396***	0.1549***	0.0994**	0.0813***	0.0603***	0.1327***	0.1056***	0.1752***
	(0.01520)	(0.02201)	(0.01353)	(0.01697)	(0.01891)	(0.02017)	(0.01119)	(0.0258)	(0.0122)	(0.0428)	(0.0074)	(0.0181)	(0.02609)	(0.0170)	(0.0135)
ESG-ENV	0.00002***	-0.00001	0.00000	-0.00000	-0.00001***										
	(0.00000)	(0.00001)	(0.00000)	(0.00000)	(0.00000)										
ESG-ENV^2	-0.00000***	0.00000	-0.00000	0.00000	0.00000***										
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)										
ESG-SOC						-0.00001***	-0.00001***	-0.00000	-0.00002***	-0.00001***					
						(0.00000)	(0.00000)	(0.00000)	(0.00001)	(0.00000)					
ESG-SOC^2						0.00000***	0.00000***	0.00000***	0.00000***	0.00000**					
						(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)					
ESG-GOV											0.00002***	0.00002***	0.00003***	0.00002***	0.00001***
											(0.00000)	(0.00000)	(0.00001)	(0.00000)	(0.00000)
ESG-GOV^2											-0.00000***	-0.00000***	-0.00000***	-0.00000***	-0.00000***
											(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
LDEP	0.0009***	0.00001	0.0012***	0.0012***	0.0017***	0.00036***	0.00026	0.00100***	0.00137***	0.00245***	0.00057***	0.00045**	0.00112***	0.00148***	0.00287***
	(0.00009)	(0.00015)	(0.00019)	(0.00021)	(0.00019)	(0.00014)	(0.00022)	(0.00020)	(0.00039)	(0.00013)	(0.00007)	(0.00021)	(0.00015)	(0.00040)	(0.00011)
SOL	0.00173***	-0.00005	0.00149***	0.00083*	-0.00405***	-0.00069***	-0.00078*	0.00055	0.00027	-0.00594***	0.00004	-0.00021	0.00139**	0.00062	-0.00204
	(0.00020)	(0.00036)	(0.00048)	(0.00049)	(0.00038)	(0.00017)	(0.00042)	(0.00096)	(0.00044)	(0.00056)	(0.00030)	(0.00026)	(0.00065)	(0.00076)	(0.00181)
EQ	0.37604***	0.44910***	0.51808***	0.55692***	0.66537***	0.38160***	0.43202***	0.52940***	0.52870***	0.69603***	0.37316***	0.39773***	0.49002***	0.53349***	0.66309***
	(0.00582)	(0.01880)	(0.01963)	(0.01926)	(0.01763)	(0.00631)	(0.01195)	(0.01096)	(0.00783)	(0.04792)	(0.00696)	(0.01960)	(0.02307)	(0.01200)	(0.04078)
Size	0.00017***	0.00012***	0.00004*	-0.00006*	-0.00025***	0.00020***	0.00013***	0.00001	0.00004**	-0.00013***	0.00011***	0.00012***	0.00008***	-0.00004*	-0.00014***
	(0.00001)	(0.00002)	(0.00002)	(0.00003)	(0.00002)	(0.00001)	(0.00002)	(0.00003)	(0.00002)	(0.00003)	(0.00000)	(0.00002)	(0.00001)	(0.00003)	(0.00002)
GDP	0.00002***	0.00002***	-0.00002**	-0.00000	-0.00001***	0.00002***	0.00000	-0.00004**	-0.00002**	-0.00001	0.00001***	0.00001***	-0.00001**	-0.00000	0.00002***
	(0.00000)	(0.00001)	(0.00001)	(0.00001)	(0.00000)	(0.00000)	(0.00000)	(0.00002)	(0.00001)	(0.00001)	(0.00000)	(0.00000)	(0.00000)	(0.00001)	(0.00000)
INF	-0.00001***	-0.00001***	-0.00000**	-0.00001***	-0.00001***	-0.00000***	-0.00001***	-0.00000**	-0.00000*	-0.00001***	-0.00001***	-0.00001***	-0.00001***	-0.00000***	-0.00000***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
OR	0.00001***	0.00000***	0.00001***	0.00002***	0.00001***	0.00000***	0.00000**	0.00001***	0.00001***	0.00000**	0.00001***	0.00000**	0.00001***	0.00001***	0.00002***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Year	0.00004***	0.00002***	0.00002	0.00005***	0.00005***	-0.00000	-0.00001	-0.00005	0.00003*	0.00004***	-0.00000	0.00000	0.00002**	0.00003***	0.00010***
	(0.00000)	(0.00001)	(0.00002)	(0.00001)	(0.00000)	(0.00000)	(0.00001)	(0.00005)	(0.00002)	(0.00001)	(0.00000)	(0.00001)	(0.00001)	(0.00001)	(0.00002)
Constant	-0.08120***	-0.04136***	-0.03683	-0.09219***	-0.10047***	0.00328	0.00923	0.09441	-0.05846*	-0.07609***	-0.00170	-0.00293	-0.03704**	-0.07091***	-0.20859***
	(0.00684)	(0.01275)	(0.04897)	(0.02133)	(0.00759)	(0.00821)	(0.02772)	(0.10885)	(0.03387)	(0.02891)	(0.00451)	(0.01774)	(0.01625)	(0.01655)	(0.03997)

Notes: Standard errors are shown in parentheses. *** p<0.01, ** p<0.05, * p<0

Table 7. Non-linear impact of each ESG component on bank credit growth

Variables	10th	25th	50th	75th	90th	10th	25th	50th	75th	90th	10th	25th	50th	75th	90th
LCG	0.05499***	0.05579***	0.10897***	0.03790***	0.00297	-0.00364	0.04852***	0.10987***	0.05471***	0.05972***	0.04114***	0.09070***	0.13144***	0.07514***	0.05714***
	(0.00767)	(0.01036)	(0.01006)	(0.00917)	(0.00524)	(0.01323)	(0.01442)	(0.01194)	(0.01531)	(0.00382)	(0.00558)	(0.00600)	(0.01794)	(0.00922)	(0.01309)
ESG-ENV	0.00001***	-0.00000	-0.00000	-0.00000	-0.00000										
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)										
ESG-ENV²	-0.00000***	0.00000**	0.00000	0.00000**	0.00000***										
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)										
ESG-SOC						-0.00001***	-0.00002***	-0.00001***	-0.00002***	-0.00001***					
						(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)					
ESG-SOC²						0.00000***	0.00000***	0.00000***	0.00000***	0.00000***					
						(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)					
ESG-GOV											0.00002***	0.00003***	0.00003***	0.00002***	0.00000
											(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
ESG-GOV²											-0.00000***	-0.00000***	-0.00000***	-0.00000***	-0.00000
											(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
LDEP	0.00087***	-0.00016*	0.00076***	0.00157***	0.00134***	0.00059***	-0.00025*	0.00073***	0.00160***	0.00153***	0.00099***	0.00009	0.00086***	0.00109***	0.00102***
	(0.00007)	(0.00009)	(0.00024)	(0.00017)	(0.00014)	(0.00009)	(0.00013)	(0.00021)	(0.00015)	(0.00010)	(0.00006)	(0.00006)	(0.00015)	(0.00014)	(0.00011)
SOL	0.00182***	0.00012	0.00209***	0.00172***	0.00050	-0.00190***	-0.00102***	0.00122**	0.00142**	0.00107***	-0.00202***	-0.00037	0.00105*	0.00077**	0.00164***
	(0.00013)	(0.00028)	(0.00048)	(0.00052)	(0.00037)	(0.00026)	(0.00019)	(0.00050)	(0.00061)	(0.00024)	(0.00020)	(0.00023)	(0.00063)	(0.00032)	(0.00030)
EQ	0.39228***	0.41294***	0.47214***	0.56950***	0.72054***	0.35062***	0.42062***	0.51592***	0.58902***	0.74859***	0.39648***	0.40009***	0.46664***	0.59112***	0.79730***
	(0.00570)	(0.01295)	(0.02126)	(0.01139)	(0.00924)	(0.00677)	(0.01093)	(0.01259)	(0.00836)	(0.00917)	(0.00715)	(0.00949)	(0.01969)	(0.01168)	(0.00679)
Size	0.00017***	0.00013***	0.00003***	0.00001	-0.00015***	0.00023***	0.00011***	0.00001	0.00005***	-0.0001***	0.00015***	0.00009***	0.00007***	0.00002**	-0.00011***
	(0.00000)	(0.00001)	(0.00001)	(0.00002)	(0.00002)	(0.00000)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00000)	(0.00001)	(0.00001)	(0.00001)	(0.00001)
GDP	0.00002***	0.00001***	-0.00002***	-0.00003***	0.00000	0.00002***	0.00001***	-0.00003***	-0.00002***	-0.00001***	0.00002***	0.00001***	-0.00001	-0.00001	0.00001***
	(0.00000)	(0.00000)	(0.00001)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00001)	(0.00001)	(0.00000)
INF	-0.00001***	-0.00001***	-0.00000***	-0.00000***	-0.00000***	-0.0000***	-0.00001***	-0.0000***	-0.0000***	-0.0000***	-0.00001***	-0.00001***	-0.0000***	-0.0000***	-0.00000***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
OR	0.00001***	0.00000***	0.00001***	0.00001***	-0.00002***	0.00000***	0.00000	0.00000***	0.00001***	-0.00002***	0.00001***	0.00001***	0.00001***	0.00000***	-0.00002***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Year	0.00001***	0.00000	0.00001	0.00001	-0.00002**	-0.00001**	-0.00000	-0.00002	0.00002***	-0.00004***	0.00001***	-0.00000	0.00003**	0.00002***	-0.00003***
	(0.00000)	(0.00000)	(0.00001)	(0.00001)	(0.00001)	(0.00000)	(0.00001)	(0.00001)	(0.00001)	(0.00000)	(0.00000)	(0.00001)	(0.00001)	(0.00001)	(0.00000)
Dummy Islamic	-0.00007***	0.00023***	0.00025***	0.00062***	0.00050***	-0.00001	0.00030***	0.00024***	0.00056***	0.00042***	-0.0001***	0.00021***	0.00023***	0.00060***	0.00045***
	(0.00001)	(0.00002)	(0.00003)	(0.00002)	(0.00005)	(0.00004)	(0.00003)	(0.00005)	(0.00004)	(0.00001)	(0.00001)	(0.00001)	(0.00005)	(0.00003)	(0.00002)
Dummy_ GCC	-0.00004**	-0.00007	0.00014**	0.00030***	0.00081***	0.00007*	-0.00004	0.00020***	0.00036***	0.00110***	-0.0001***	-0.0001***	0.00009	0.00031***	0.00102***
	(0.00002)	(0.00005)	(0.00007)	(0.00004)	(0.00008)	(0.00004)	(0.00004)	(0.00004)	(0.00004)	(0.00003)	(0.00001)	(0.00002)	(0.00005)	(0.00003)	(0.00005)
Dummy_ Oil Exp	0.00006***	0.00002	-0.00025***	-0.00025***	0.00032***	-0.0001***	-0.00004	-0.0002***	-0.0002***	0.00021***	-0.0002***	-0.0001***	-0.0002***	-0.0002***	0.00023***
	(0.00001)	(0.00006)	(0.00008)	(0.00004)	(0.00003)	(0.00002)	(0.00003)	(0.00005)	(0.00004)	(0.00001)	(0.00001)	(0.00001)	(0.00006)	(0.00002)	(0.00003)
Constant	-0.03560***	-0.00622	-0.02203	-0.01483	0.03315**	0.01830*	0.00915	0.03014	-0.0467***	0.08851***	-0.0263***	0.00391	-0.05587**	-0.0451***	0.06379***
	(0.00513)	(0.00838)	(0.01548)	(0.02963)	(0.01311)	(0.00944)	(0.02727)	(0.02839)	(0.01290)	(0.00902)	(0.00813)	(0.01327)	(0.02310)	(0.01589)	(0.00513)

Notes: Standard errors are shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1

4.3. Robustness check

A robustness test ensured the validity of the impact of the ESG components on bank credit growth using the gross loans over the GDP deflator as another measure of credit growth (Nizam et al., 2019). The results are shown in Appendix, Table A1, and Table A2. First, the impact of the ESG components on bank credit growth was examined, and second, the impact of the dummy variables on bank credit growth for Islamic banks, GCC, and oil-exporting countries was examined. In Table A1, the results showed consistent findings with those shown in Table 4, where a significant positive link between ESG and bank credit growth was observed at the lowest quantile (25^{th}) and a significant negative relationship between ESG and credit growth at the highest quantiles (75^{th} and 90^{th}). Moreover, in Table A2, the results showed that Islamic banks had a significant positive influence on bank credit growth compared to conventional banks. GCC banks had higher credit growth than non-GCC banks in the MENA region.

Regarding whether a country was an oil exporter, the results showed a significant negative relationship with bank credit growth at (the 50^{th} and 75^{th}) quantiles. However, it significantly positively affected bank credit growth at the highest quantiles. Those findings are consistent with the initial results shown in Table 5.

5. CONCLUSION AND POLICY IMPLICATIONS

The present paper investigated the impact of ESG disclosure on bank credit growth. It also examined the influence of bank type, country location, and whether the country was oil-exporting on bank credit growth in the MENA region. The data comprised 394 banks in 11 MENA region countries spanning 2010-2023 and was analysed using a quantile regression method. The results found that the ESG components varied with each quantile, with a significant positive (negative) effect at the lowest (highest) quantiles with bank credit growth. The analysis also showed that Islamic banks had a positive link with bank credit growth when moving from the lowest to the highest quantiles. In addition, the results indicated that GCC countries had a significant negative (positive) impact at the lowest (highest) quantiles with bank credit growth, suggesting that bank credit growth was higher in GCC countries than in other MENA region countries. Regarding oil exporting countries, the results showed a significant negative relationship with bank credit growth at the 50^{th} and 75^{th} quantiles and a significant positive effect at the highest quantile (90^{th}).

The findings have drawn various policy implications for policymakers and authorities. First, bank regulators must monitor the adoption of ESG standards that recommend spending appropriate funds on ESG activities to maintain costs and increase profitability for banks with low credit growth. Moreover, banks with high credit growth must maintain ESG investments until they reach a positive performance and profitability. Second, policymakers, especially in oil-exporting countries, must

establish regulations on banks to diversify their investments in non-oil sectors, such as retail and stock markets, and allocate loans to different businesses to reduce credit risks and non-performing loans.

6. LIMITATIONS AND FUTURE RESEARCH

The present study exhibited some limitations that offer opportunities for further research. Few banks disclose ESG activities in their annual reports, which resulted in a small sample size. However, this study's authors believe that the sample size obtained provided significant results on the impact of ESG disclosure on bank credit growth in the MENA region. Future research could extend the results by examining the impact of ESG disclosure on bank credit growth by comparing developed and emerging economies. Moreover, future studies could examine other factors (credit and financial risks, non-performing loans, liquidity, and the economic uncertainty index) that could impact ESG disclosure and bank credit growth.

DISCLOSURE STATEMENT

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Competing Interest: The authors declare that they have no competing financial interests that would have appeared to affect the work presented in this study.
Ethics statement: The authors declare that this study is an original paper that did not use other information that requires ethical approval.
Consent for publication: The authors declare their consent for publication.
Consent to participate: The authors confirm that they have equally participated in the manuscript and know the ethical responsibilities.
Data availability: All data generated during this study were extracted from the Bank Scope and World Bank Development databases.
Author contributions: Aysha AlHamrani, the corresponding author, performed the literature search, data gathering and analysis, and manuscript drafting. Dr. Atif Awad and Dr. Mohamed Albaity critically revised the work and made the required amendments to the manuscript.

APPENDIX 1

Table A1. The non-linear impact of ESG on bank credit growth

Variables	10th	25th	50th	75th	90th
LCG	-0.05449***	0.08254***	0.12179***	0.10927***	0.12516***
	(0.01068)	(0.01863)	(0.02779)	(0.02085)	(0.02300)
ESG	0.00001**	-0.00001**	0.00000	-0.00003***	-0.00002***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00001)
ESG2	-0.00000**	0.00000***	0.00000	0.00000***	0.00000***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
LDEP	0.00048***	0.00020	0.00107***	0.00186***	0.00306***
	(0.00008)	(0.00017)	(0.00023)	(0.00016)	(0.00020)
SOL	0.00046	-0.00027	0.00198***	-0.00012	-0.00664***
	(0.00042)	(0.00028)	(0.00055)	(0.00069)	(0.00086)
EQ	0.40137***	0.48579***	0.52722***	0.59656***	0.81967***
	(0.01103)	(0.00981)	(0.01559)	(0.02496)	(0.02608)
Size	0.00019***	0.00013***	0.00001	-0.00002	-0.00011***
	(0.00002)	(0.00001)	(0.00001)	(0.00003)	(0.00001)
GDP	0.00003***	0.00002***	-0.00002***	-0.00001***	-0.00005***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00001)
INF	-0.00000***	-0.00001***	-0.00001***	-0.00000***	-0.00000***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
OR	0.00001***	0.00000***	0.00001***	0.00001***	0.00001***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Year	0.00001**	0.00001	-0.00001	0.00003***	0.00003***
	(0.00001)	(0.00000)	(0.00002)	(0.00001)	(0.00001)
Constant	-0.03477***	-0.01613*	0.01789	-0.06913**	-0.05329***
	(0.01257)	(0.00885)	(0.03171)	(0.02682)	(0.01241)
Observations	394	394	394	394	394

Notes: Standard errors are shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A2. The non-linear impact of ESG on bank credit growth

Variables	10th	25th	50th	75th	90th
LCG	0.05113***	0.09705***	0.10511***	0.04754***	0.04492***
	(0.01196)	(0.01572)	(0.01659)	(0.00936)	(0.00960)
ESG	0.00002***	-0.00000	-0.00001**	-0.00000	-0.00000*
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
ESG2	-0.00000***	0.00000	0.00000***	0.00000**	0.00000***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
LDEP	0.00057***	-0.00000	0.00097***	0.00151***	0.00089***
	(0.00006)	(0.00016)	(0.00012)	(0.00010)	(0.00028)
SOL	-0.00161***	-0.00042*	0.00322***	0.00047	0.00118***
	(0.00021)	(0.00022)	(0.00079)	(0.00056)	(0.00029)
EQ	0.43130***	0.47482***	0.52830***	0.59436***	0.85431***
	(0.00412)	(0.00857)	(0.01148)	(0.01079)	(0.01190)
Size	0.00015***	0.00007***	-0.00001	0.00001	-0.00019***
	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00002)
GDP	0.00002***	0.00002***	-0.00002***	-0.00002***	0.00000
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
INF	-0.00001***	-0.00001***	-0.00000**	-0.00000***	-0.00000***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
OR	0.00002***	0.00001***	0.00001***	0.00001***	-0.00002***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Year	0.00002***	0.00001*	0.00000	0.00002***	-0.00005***
	(0.00000)	(0.00001)	(0.00001)	(0.00000)	(0.00000)
Dummy_ Islamic	-0.00004	0.00016***	0.00020***	0.00059***	0.00034***
	(0.00003)	(0.00005)	(0.00003)	(0.00003)	(0.00003)
Dummy_GCC	-0.00033***	-0.00007**	0.00020***	0.00022***	0.00125***
	(0.00002)	(0.00004)	(0.00007)	(0.00006)	(0.00008)
Dummy_Oil_ Exp	-0.00001	-0.00002	-0.00015***	-0.00024***	0.00021***
	(0.00002)	(0.00003)	(0.00003)	(0.00003)	(0.00004)
Constant	-0.04149***	-0.01971*	-0.00458	-0.04228***	0.10755***
	(0.00848)	(0.01078)	(0.01670)	(0.00763)	(0.00758)
Observations	394	394	394	394	394

Notes: Standard errors are shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1

APPENDIX 2

Figure 2. Graphical presentation of the non-linear impact of ESG on bank credit growth

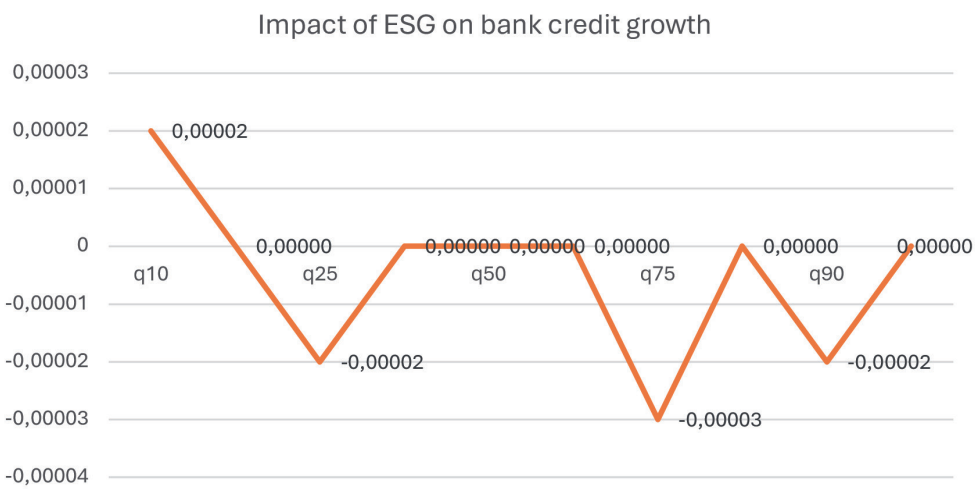


Figure 3. Graphical presentation of the impact of other factors on credit growth

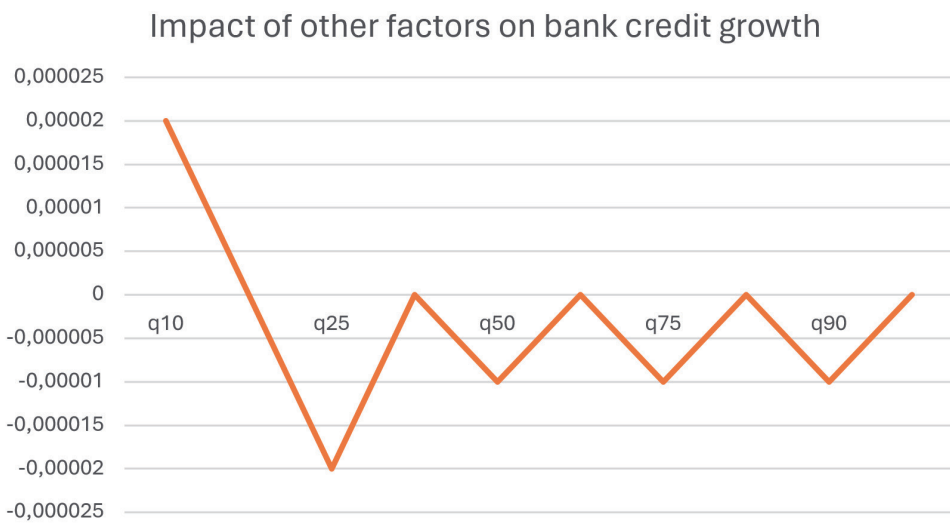


Figure 4. The graphical presentation of the impact of the environmental pillar on bank credit growth

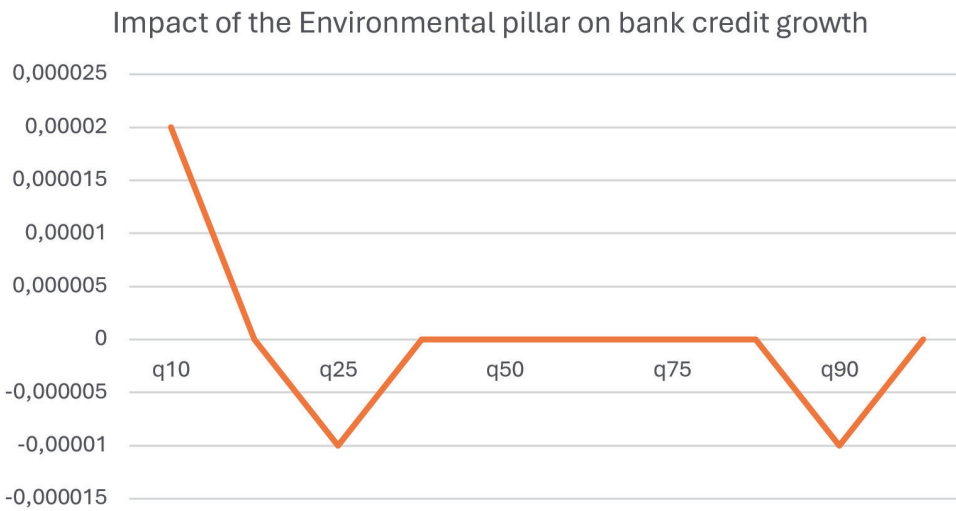


Figure 5. Graphical presentation of the impact of the environmental pillar on bank credit growth, including dummy variables.

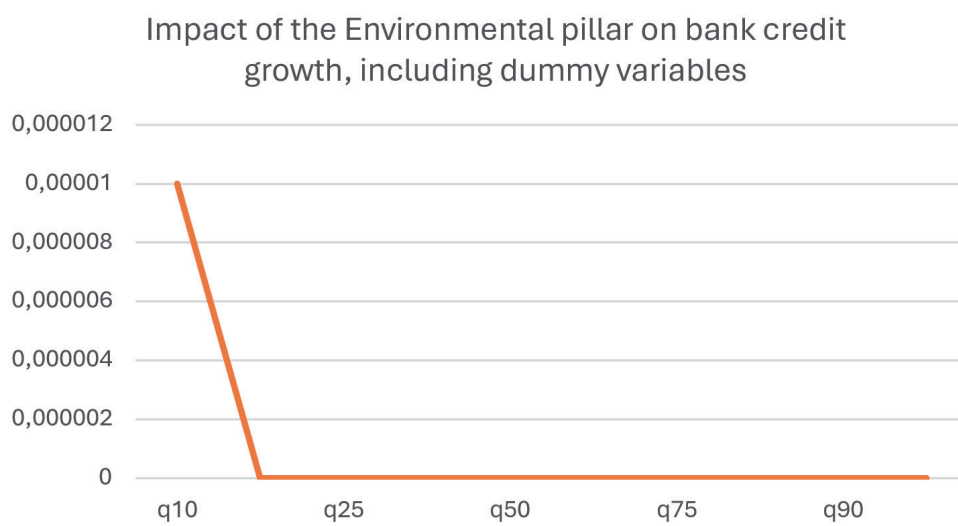


Figure 6. Graphical presentation of the impact of the social pillar on bank credit growth

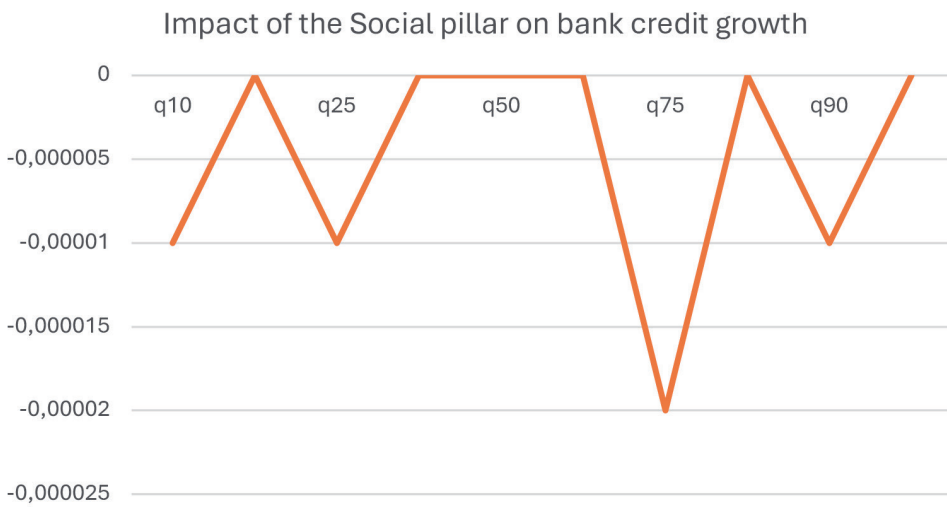


Figure 7. The graphical presentation of the impact of the social pillar on bank credit growth, including dummy variables.

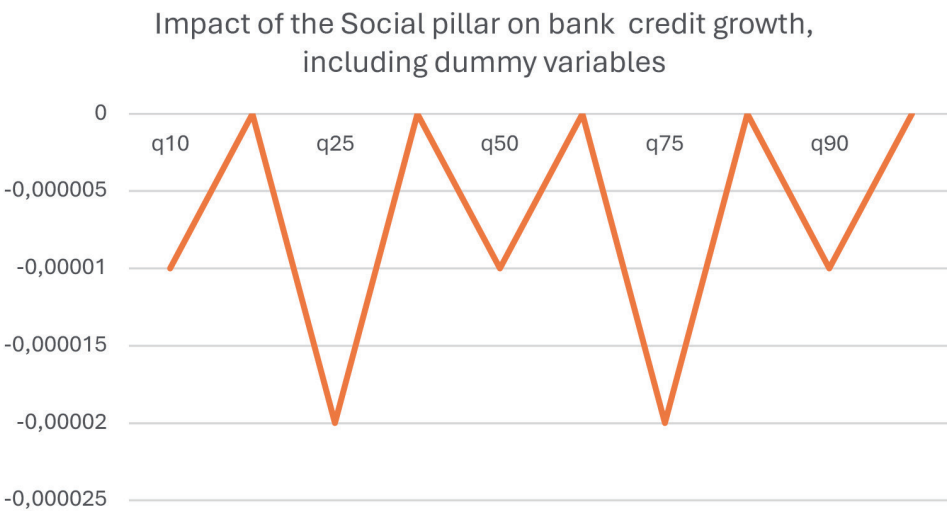


Figure 8. The graphical presentation of the impact of the governance pillar on bank credit growth

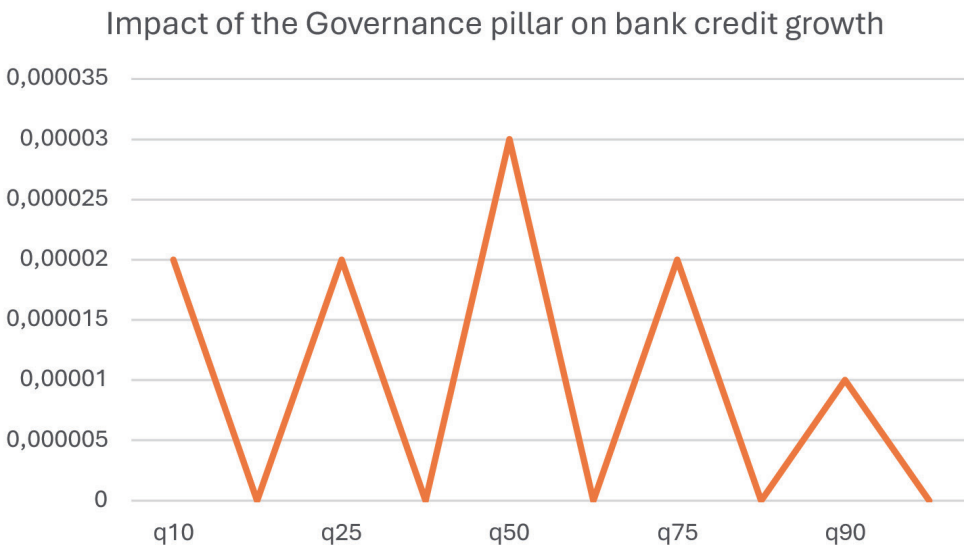
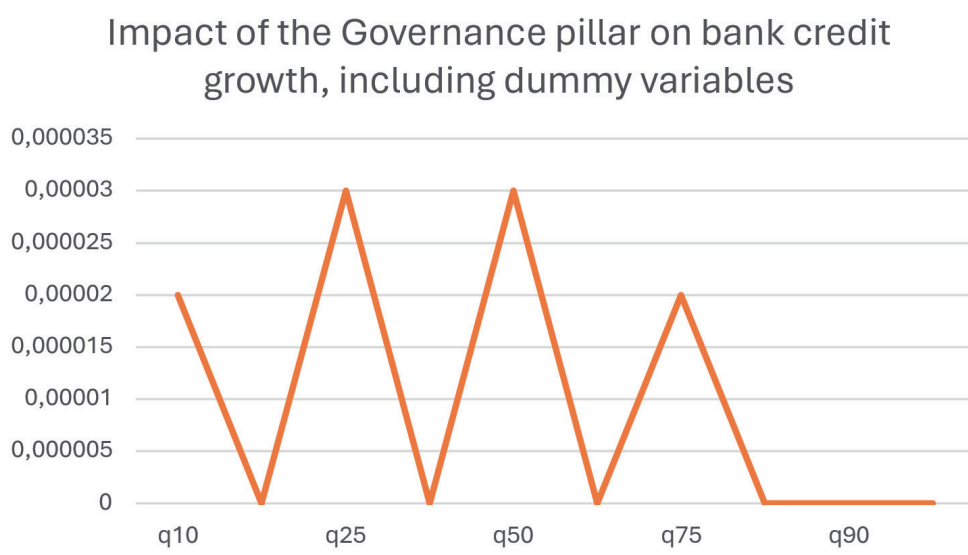


Figure 9. The graphical presentation of the impact of the governance pillar on bank credit growth, including dummy variables.



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