# Rethinking Competition Policy for Sustainable Banking: When ESG Efforts Backfire

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## Abstract

This study integrates stakeholder theory with the competition-stability nexus to investigate how market competition moderates the relationship between environmental practices and bank stability. While prior research treats these domains separately, we theorize that competitive pressures alter banks' ability to translate environmental commitments into stability gains, as stakeholder demands and institutional contexts shape strategic trade-offs. Using a panel of 307 banks across 54 countries (2014–2023), we find that environmental practices reduce bank stability under high competition, supporting the competition-fragility view. This effect is pronounced in developed markets, where institutional pressures amplify short-term financial constraints, but is absent in developing economies due to weaker regulatory enforcement and differing stakeholder priorities. Notably, COVID-19 suggests crisis-contingent dynamics. We show how institutional contexts shape sustainability efforts' impact on resilience, crucial for policymakers. Developed economies may need moderated competition to align financial stability with sustainability, while developing contexts require stronger institutional frameworks and trade-offs.



**Keywords:** Environment-stability, competition, banks, COVID-19, ESG
**JEL Classification Codes :** M14 ; Q01 ; A13 ; G21 ; G30

# 1. Introduction

The ever-rising climatic temperature has become a factor for investors and firms' customers. The continued exploitation of natural resources and environmental degradation has brought the issue of global disclosure of environmentally friendly practices into the limelight. Practitioners and researchers have had a growing interest in corporate social responsibility (CSR) and the importance of environmental, social, and governance (ESG) issues over the past two decades. A strong and healthy environment is very important for stability. The degradation of the environment poses a threat to resources. Therefore, it is crucial to maintain environments for economic resilience. Financial institutions increasingly recognize threats, including deforestation, climate change, and pollution, that directly impact financial stability in various sectors. Sustainable investing plays a crucial role in the financial performance of firms. Sensitized investors paying attention to socially responsible and sustainable investing may lead to the improved financial performance of environmentally friendly firms (Brunen & Laubach, 2022; Garg et al., 2022; Hawn et al., 2018; Khattak & Buerhan Saiti, 2020). Moreover, financial stability can relate directly to environmental practices because investment in sustainable practices and technologies enhances eco-friendly innovations that lead to environmental conservation, and eco-friendly policies are important in strengthening this relationship. International bodies and governments play vital roles in shaping and incentivizing sustainable activities and penalizing detrimental activities that affect the environment (Chiaramonte et al., 2022; Shi et al., 2024). Increasing climate change is alarming, and public and private institutions must play their role in mitigating the effects of these harms.

This urgency extends to the banks, which are at the epicenter of the discussion (Azmi et al., 2021; Battiston et al., 2021; D'Orazio, 2023; Ordonez-Ponce et al., 2024; Quorning, 2024). Banks are crucial to any country's economic growth and serve as intermediaries that effectively channel savings to investments. The theoretical foundations for understanding these dynamics draw from two distinct but interconnected literatures. Firstly, considering the stakeholder theory, we argue that stringent stakeholder demands may force banks to prioritize short-term stability over long-term environmental goals. We argue that environmental practices might have a different impact on the stability of banks in competitive sectors than on banks in less competitive sectors. We ask whether competition plays a role in shaping the relationship between environmental practices and

bank stability. Banks focusing on environmental protection can attract sustainable investors, enhancing financial performance and increasing stock prices (Ellili, & Nobanee, 2023; Tan et al., 2024). However, an excessive focus on environmental practices might overburden banks, depleting their stability. Furthermore, banks facing greater market competition offer higher deposit rates and lower lending rates with more relaxed lending conditions. Relaxed lending conditions might worsen during times of high competition, further affecting their stability. Combining these factors might have exponential impacts on bank fragility. Furthermore, banks might use environmental practices to their advantage during periods of high competition to gain an edge over their counterparts (Cicchiello et al., 2023), helping them capture extra market share of deposits and loans. We explore the impact of environmental practices on banking stability and examine whether competition matters in this relationship.

Drawing on institutional theory, we debate that competitive pressures create distinct trade-offs for banks balancing sustainability commitments with financial resilience (Naeem, Cankaya & Bildik, 2022; Singhania & Saini, 2023). Weaker institutional enforcement in developing economies could dilute these pressures. Developed economies have more stringent regulations, green finance projects, and initiatives, while emerging economies face challenges of human capital and enforcement. This might affect banking sector stability and environmental practices in these economies differently. The banking sector of developed economies has better risk management practices, diversified portfolios, and exposure to global markets, while banks in emerging economies are still working to achieve such robust practices. Moreover, developed economies are less vulnerable to climate risk than developing economies, which affects banks' lending or financing decisions and impacts banking sector stability (Alam et al., 2024). Developed economies need stability while enhancing environmental practices, and therefore, emerging economies may require targeted interventions. Precisely, the difference in Economic conditions, Regulatory Environment, Access to Technology and Innovation, Market Conditions, Growth Opportunities and Challenges, and Risk Management Practices among economies in our sample motivates us to explore whether the nexus is different in these economies and whether competition shapes the relationship between competition and stability differently. Separating the sample into banks from developed and developing economies will provide a clearer understanding of the varying characteristics that makes the impact different.

Like any other industry, banks faced difficulties of survival during the COVID-19 pandemic. The disruption in banking operations, including the closure of branches, remote work arrangements, and changes in customer behaviour, compelled banks to adapt to new situations (D'Orazio, 2023). Banks were also severely affected during the pandemic by increased non-performing loans, liquidity crunches, and overall market volatility (Elnahass et al., 2021). The impact of the COVID-19 pandemic on the banking sector is evident in recent studies, which push us to explore whether environmental practices complement pandemic effects in reducing shocks to the banking sector. Lastly, the global financial crisis and COVID-19 pandemic made banks more vulnerable, especially in an era of financial globalization. These events acted as a wake-up call to policymakers, regulators, governments, and the banking sector itself, igniting debate on how to ensure sustainability in the long run (Naseer et al., 2023; Shabir et al., 2023).

Considering the discussion of the simultaneous importance of environmental practices and competition, we address following questions: 1) what happens to bank stability at the intersection of these concerns, and 2) whether the effect is different for developed and developing economies, and 3) whether the dynamics differed during COVID-19. To address the objectives of this study, we use a global sample of 307 banks from 54 countries for the period 2014-23. The key findings of this research are a negative impact of environmental practices on bank stability in the full sample and subsamples, for developing and developed economies. The impact of competition in this scenario differs significantly in developing and developed countries according to our findings. Competition negatively affects bank stability, supporting the view of competition fragility, but no significant evidence of this is found in developing countries. Furthermore, competition negatively moderates the impact of environmental investment on bank stability. For developing countries, however, the moderating role is positive. This study is crucial for banks, policymakers, and advocates of environmental practice hoping to attain a more stable and sustainable future.

The next section is the literature review and hypothesis development, followed by a detailed explanation of the methodology, variables, and data curation. The subsequent section presents the study's results and discusses its findings. Lastly, the research concludes with recommendations for managers, regulators, and policymakers.

## 2. Literature Review

Despite the strong recommendation of eco-friendly environmental practices, the relationship between environmental and financial performance remains unclear. He, Tan, Liu, and Zhang (2020) examine environmental laws and their impact on the financial performance of Chinese firms, finding that these laws are not always compelling in China. However, in this context, the protection of property rights can make a big difference and improve financial performance, making strict environmental laws less damaging financially. Yao et al. (2021) examine the impact of the green credit policy on the financial performance of companies and report that performance is negatively affected in industries with high carbon emissions. The effect is more pronounced in state-owned enterprises and big firms with institutional ownership, as well as in firms that receive substantial coverage during economic instability. The green credit policy limits the availability of financial resources to heavily polluting firms, shrinking investment levels. The study highlights the importance of controlling carbon emissions from these giants and encourages industrial revolutions in developing economies.

Environmental practices are positively correlated with financial stability in the long run. Organizations opting for eco-friendly policies simultaneously impact operational efficiency, cost-effectiveness, risk mitigation, and financial resilience. This correlation supports the argument that commitment to environmental practices is ethically and strategically important (Karim et al., 2022). Dafermos and Nikolaidi (2018) study firms and banks and explore the impact of environmental practices and financial stability. By employing the dynamic ecosystem-finance economy model based on the consistent stock-flow approach, simulations show that climate change might lead to economic catastrophes that reduce a firm's financial performance and deteriorate its financial stability. Secondly, lower financial performance and environmental degradation decrease investor confidence, leading to a fire sale of the financial assets of the corporate sector. The discussion of the environment-stability nexus leads us to our first hypothesis:

Hypothesis 1a: Environmental sustainability enhances banking stability.

Keeley (1990) proposes a competition and financial stability nexus which implies that banks struggle to earn a monopoly due to competitive markets, resulting in decreased profits and

instability (Jiménez et al., 2013; Meslier et al., 2017). Contrary to this argument, this competition and stability nexus creates pressure that forces banks to offer loans at lower rates, aiming to avoid nonperforming loans since borrowers can more easily afford to repay at lower rates (Schaeck et al., 2009). Despite the importance of the competition stability relationship, this area of research remains unexplored. The correlations have been examined separately, solely giving importance to competition among banks (Cupian & Abduh, 2017; Katchouli, 2014). Kabir and Worthington (2017) find a standard deviation shock to the Lerner index, which implies a positive relationship between a lower level of competition and a higher level of stability. Banks encountering higher competition show less financial performance and are more prone to credit and default. Alam et al. (2018) and Khattak et al. (2021) report a positive association between bank fragility and competition, whereas Azmi et al. (2019) find no association. Considering the contradictory evidence, we test the hypothesis:

Hypothesis 1b: Competition lowers banking stability.

Competition might enhance performance in terms of innovation, productivity, and efficiency. Studies of non-financial firms by Velte (2019), Achour & Boukattaya (2021), Ullah et al. (2022), Nekhili et al. (2021), Boulhaga et al. (2023), and Fatemi et al. (2018) identify, respectively, the moderating roles of CEO power, firm visibility, institutional ownership, the presence of employees on boards, internal quality control, and disclosure of ESG. Studies on the moderating role of competition between environmental practices and stability among banks are rather scarce. Martins (2022) studies the ways in which competition affects ESG practices in 22 emerging countries, and finds that companies reduce ESG practices, considering it an extra cost, when encountering competition. These findings are the opposite of those for developed economies. Cicchiello, Cotugno, & Foroni (2023) show that market competition affects bank ESG controversies, and these issues increase if banks operate in less competitive markets. Furthermore, they conclude, “competition acts as a disincentive mechanism for banks in an immoral or unethical manner”. Therefore, we argue that competition might have a role to play in shaping the relationship between environment and stability. Banks may compete to capture that extra market share through enhanced engagement in environmental practices, which might lead to enhanced stability/fragility. We therefore test the hypothesis:

Hypothesis 2: Competition affects the relationship between environmental practices and banking stability.

Ferriani and Natoli (2020), Singh (2020), and Rubbaniy et al. (2021) assert that a company's sustainable assets increase financial stability in an economic downturn. Liu (2022) and Yi et al. (2021) argue that sustainable assets have not proved protective during the COVID-19 pandemic, therefore one cannot claim that sustainable assets are suitable buffers for firms in times of crisis. More recently, it has been argued that firms involved in sustainable practices were more stable during the COVID-19 pandemic and were better off because of their involvement in such practices (Li et al., 2023). We argue that banks become extra competitive during times of crisis to stay afloat. Therefore, the role of competition in shaping the relationship between environmental practices and stability might be different during a crisis such as COVID-19. Precisely, we explore if the role of competition is any different during a crisis like COVID-19. This leads us to our fourth hypothesis:

Hypothesis 3: Competition shaped the relationship between environmental practices and stability differently during COVID-19.

Singhania & Saini (2023) argue that environmental practices are equally crucial for developed and developing countries for information asymmetry concerns and establishing resilient business operations, while Huang & Ge (2024) suggest that ESG disclosure quality has a higher correlation with market value in developed economies. Saif-Alyousfi and Alshammari (2023) suggest that individual ESG dimensions impact banks' financial indicators more in developed countries. Also, due to weak transparency and rule of law in the markets of developing economies, implementing environmental practices faces many challenges. Considering the works of Alam et al. (2024), Huang & Ge (2024), Naeem, Cankaya & Bildik (2022), Singhania & Saini (2023), and Wasiuzzaman & Subramaniam (2023) on bank ESG and its individual dimensions in developed and developing countries, it is evident that developed countries are ahead in adopting environmental practices and have stricter regulations, better institutional environments, and take on green finance initiatives, while developing economies are lacking behind in these practices. Therefore, we argue that banks in developed economies might be extra vulnerable when capturing extra market share in a competitive market compared to banks in developing economies. This leads us to estimate the above hypotheses in split sample settings to understand if the relationship

dynamics differ across development settings leading us to the following developed vs developing hypotheses:

Hypothesis 4a: Environmental sustainability enhances banking stability in developing countries

Hypothesis 4b: Competition lowers banking stability in developing countries

Hypothesis 4c: The role of Competition between environmental practices and stability is positive in developing economies

Hypothesis 4d: The role of Competition between environmental practices and stability is positive in developing economies during COVID-19

# 3. Method and Data

## 3.1. Empirical models

The model used to address the objectives of the study is constructed by estimating the ordinary least squares (OLS) model (Chiaramonte et al., 2024; Kumar et al., 2023; Li et al., 2023; Trinh et al., 2020):

$$ZSC_{ijt} = \beta_0 + \beta_1 EN_{ijt-1} + \beta_2 X_{ijt-1} + \beta_3 \text{COVID} + \varepsilon_{ijt} \quad (1)$$

$$ZSC_{ijt} = \beta_0 + \beta_1 EN_{ijt-1} + \beta_2 LENR_{ijt-1} + \beta_3 X_{ijt-1} + \beta_4 \text{COVID} + \varepsilon_{ijt} \quad (2)$$

Equation (1) gives the relationship between environmental investments (EN) and bank stability (ZSC). We modify equation (1) by introducing competition into the model and exploring whether the relationship is any different when competition (LERN) is controlled for in equation (2). In the above equations, *i, j*, and *t* denote the bank, country, and time. X shows bank, industry, and country-level control variables; COVID is the dummy variable to control for the COVID-19 pandemic and $\varepsilon_{ijt}$ represents the error term of the models.

To explore the possible role of competition in shaping the relationship between environment investment strategies and bank stability, we introduce an interaction term into the model,

*EN*LENR.* The interaction term indicates the possible moderating role of competition. This gives equation (3):

$$ZSC_{ijt} = \beta_0 + \beta_1 EN_{ijt-1} + \beta_2 LENR_{ijt-1} + \beta_3 EN_{ijt-1} * LENR_{ijt-1} + \beta_4 X_{ijt-1} + \beta_5 \text{COVID} + \varepsilon_{ijt} \quad (3)$$

We further modify the model to explore whether the role of competition in shaping the relationship between environmental practices and bank stability is different during a crisis such as COVID-19, we develop a 3-way interaction term to address the difference in the moderating role of competition, $EN * LENR * COVID$:

$$ZSC_{ijt} = \beta_0 + \beta_1 EN_{ijt-1} + \beta_2 LENR_{ijt-1} + \beta_3 EN_{ijt-1} * LENR_{ijt-1} + \beta_4 EN_{ijt-1} * COVID + \beta_5 LENR_{ijt-1} * COVID + \beta_6 EN_{ijt-1} * LENR_{ijt-1} * COVID + \beta_7 X_{ijt-1} + \beta_8 \text{COVID} + \varepsilon_{ijt} \quad (4)$$

Here, $\beta_{0-8}$ shows the model parameters to be estimated. It is understandable to expect reverse causality, prevailing simultaneity, and endogeneity in such a dataset. We, therefore, use one-period lagged values for explanatory variables, as shown in the models. Moreover, we employ endogeneity treatment estimators, the two-step system and differenced generalized method of moments (GMM), to minimize such potential issues. More importantly, we re-estimate the four models with different variable specifications and time period settings using the environmental score provided by Morgan Stanley Capital International's (MSCI) Intangible Value Assessment (IVA), where the COVID-19 crisis is replaced with the global financial crisis of 2008-09.

## 3.2. Data and Sample

We base the variable selection on the existing ample research on the determinants of bank risk-taking behaviour and stability (see, for example, Azmi et al., 2024; Desalegn et al., 2023; Shabir et al., 2021; Tran & Nguyen, 2024). Zscore is employed as the widely used measure of bank stability. The indicator measures the deviations in how far a bank is from failing due to capital loss. It utilizes accounting metrics to determine the default probability of an individual bank. Z-scores compares the equity ratio to the change in returns to capture the volatility in returns, where the returns are

estimated by dividing the sum of the equity ratio and return on assets by the standard deviations (3-years rolling window) of return on assets (Chiaramonte et al., 2016, Khattak et al., 2021).

We use the environmental impact score sourced from London Stock Exchange Group (LSEG) and MSCI measuring banks' environmental financing, due diligence, and green financing (Khattak, 2020; Khattak & Buerhan Saiti, 2020; Li et al., 2023; Schmidt, 2022). The difference between the two scores is the methodology used to calculate the scores. One main difference is that the scores provided by LSEG database range from 0-100, while the score from MCSI ranges from 0-10. Nowadays, firms and banks are inclined to invest in social projects, which is therefore considered an important material concern and one of the important determinants of firms' overall policies.

For competition, we use the widely used measure of market power, the Lerner index, as an inverse measure of competition (Canta et al., 2023; Dai & Guo, 2020; Li et al., 2024; Tan et al., 2021; Tran & Nguyen, 2024; Yin, 2021). Following the works of Azmi et al., 2024, Li et al., 2023, Salim et al., 2023 and Tran & Nguyen, 2024, we use nine (09) bank-specific variables, including environmental practices and competition, one industry variable, and two (02) country-level variables in our models, which are explained in Table 1. Moreover, since the sampling period involves the COVID-19 period, we control for the pandemic and use a dummy variable which takes the value of 1 if the year is 2020 and 0 otherwise (Elnahass et al., 2021; Li et al., 2023).

**<< Insert Table 1 about here >>**

We source bank-level data from Fitch Connect, environmental practices from LSEG database (formerly Refinitiv), and country-level data from World Development Indicators. Thomson Reuter's Definitive LSEG ESG data is widely used and is one of the leading information providers on sustainability. We apply three levels of filtration to arrive at a reliable dataset. Firstly, the dataset takes data from consolidated financial statements where available and unconsolidated where not available. Second, since the dataset is mainly driven by environmental information, we drop banks with no information on environmental investments, which leads us to keep data from 2014 onwards. Third, we further drop banks without information on input components to estimate the competition measure. Lastly, we limit the dataset to banks with at least four years of observations. These filters give us a dataset of 307 banks from 54 countries for the period 2014-23. Developed economies are said to be more sustainability-conscious than developing economies, and to

investigate this we use the World Economic Situation and Prospects (2023) and further split the sample into developed and developing economies. The final dataset comprises 187 banks from 22 developed economies and 120 banks from 32 developing economies. Examination of this extensive data helps explain the complexities of the relationship between environmental practices and bank stability in the presence of competition and shed light on inconsistencies between developing and developed countries.

Table 2 presents the descriptive statistics of the dataset of the sample. The mean for bank stability (LZSC) is 4.23. Environmental practices have a mean score of 42, indicating a moderate level of environmental engagement. Competition (LENR, the inverse proxy for competition) has a mean value of 0.33, suggesting moderate competition in the sampling countries. Overall, the bank's size, proxied by the bank's total assets, has a mean of 10.39 with a variation of 1.64 (log taken).

Table 3 presents the pairwise correlations between the variables of the study. Environment and bank stability have a negative correlation, suggesting that bank stability is lower in times of higher environmental practices. The bank competition measure (Lerner index) positively correlates with bank stability, suggesting that bank stability is better during lower competition (higher market power). Diversification, bank size, deposits, efficiency, and inflation rate show a negative correlation, while equity ratio, ROA, and GDP growth rate show positive correlations. Among the explanatory variables, the highest correlation is 0.74 between the market share of deposits and market concentration, suggesting that banks in concentrated markets have higher deposits. Other than this, no significant correlations indicate that multicollinearity is unlikely.

**<< Insert Table 2 & 3 about here >>**

# 4. Findings

## 4.1. Impact of Environment on Stability

Table 4 presents the regression results from equation (1). In panel A, the three (03) models show the relationship between environment practices and bank stability. In panel B, we repeat the regression analysis using the competition measure as a control variable in the model. The results suggest that environmental ratings negatively impact overall banking stability. This is true for the

full sample and developed countries. Maintaining a comprehensive environmental strategy comes at a cost. This cost includes prevention costs (costs of training employees), appraisal costs (costs of monitoring equipment), internal failure costs (costs of separating waste), and external failure costs (costs of addressing hazardous emissions) (Chandrashekar et al., 1999). There are concerns about the cost of shifting supply chains to build better relationships and cope with moral problems (Miles & Russell, 1997), which might lead to lower profitability, efficiency, and overall instability. This makes it more challenging for banks to achieve better sustainability practices with extra costs. Interestingly, the magnitude of the impact declines for developed economies when competition is controlled for in Panel B. In panel B for the full sample, the results become insignificant when we control for competition. This change in the impact shows that competition might have a role to play in making the relationship between environmental investment and stability. In panel B, the impact of competition (market power) is negative (positive) for the entire sample and developed economies. This leads us to infer that competition lowers the overall bank stability in the respective samples, supporting the competition-fragility view. We do not see any noticeable impact of competition on banks in developing economies.

Looking at the determinants of stability, bank size is found to negatively impact bank stability. This suggests that bigger banks are less stable and have no advantage of being bigger, or they do not use their assets efficiently, leading to poor stability. The negative coefficients for diversification suggest that diversification might hurt banks in the sample countries, leading us to conclude the dark side of diversification, which suggests that diversifying too much to the extent where it cannot be managed leads to overall fragility. Profitability is found to be positively significant, suggesting that banks with greater profits are more stable in the sample economies and accumulate extra profits, resulting in enhanced stability. In panel A (where competition is not controlled), however, the relationship in developing economies is negative, suggesting that banks with higher profits might have lower stability. This might be due to the extra risks banks deal with due to relaxed lending conditions during competition. Bank inefficiency, measured by the cost-to-income ratio, shows a negative relationship, suggesting banks with more significant costs are less stable. Furthermore, we see that banks with extra margins are less stable. The GDP growth rate is positive, suggesting that banks are more stable during higher GDP growth. Inflation hurts stability in the sample countries, which might be because banks charge higher interest rates during higher inflation,

making it difficult for borrowers to pay back or not take out loans, leading to lower profits and, thus, lower stability. Overall, the banking sector's stability was lower during the COVID-19 period.

**<< Insert Table 4 about here >>**

## 4.2. Possible Role of Competition

Taking our cue from the results in Table 4 and the discussion above, it is evident that competition has something to do with the relationship between the environment and bank stability. This is our motivation for enhancing this study and exploring the possible moderating role of competition between environment and stability. Table 5 gives the results of the possible role of bank competition in shaping the relationship between the environment and bank stability by estimating model (3). Further exploration shows that the coefficients derived for the interaction terms (EN*LENR) reveal a role of competition. Since the Lerner index is an inverse proxy for bank competition, it should be carefully (inversely) interpreted.[1] The coefficient for the full sample and developed countries shows a negative role of competition (a positive sign is interpreted as negative). The marginal effects of environmental practices are plotted in Figures 1, 2, and 3 for the full sample, developed and developing economies. Figure 1 shows that competition negatively shapes the relationship between environmental practices and bank stability within these economies. In other words, as competition decreases (market power increases), the impact of environmental practices on bank stability moves towards a positive impact. In other words, environmental practices lower bank stability during high competition and enhance stability during low competition. Environmental practices might become an extra cost during times of high competition. During moderate competition, competition does not have a significant role. This is also true for banks in developed countries, as shown in Figure 2. However, the role is even more significant in developed countries. The role is negative during high competition (low market power), insignificant during moderate and above moderate competition, and positive during low competition (high market power). This suggests that environmental strategies might not work during higher competitive pressure, and adversely affect overall bank stability. For banks in developing countries, shown in Figure 3, the coefficient for the interaction term is insignificant, suggesting no role of competition in the relationship.

[1] Higher market power means lower competition.

**<< Insert Table 5 about here >>**

The overall results suggest that banks in developed economies might not benefit from environmental investment strategies. This might be due to the 'developed' nature of the banking system within these countries, where extra investment in environmental practices becomes a disadvantage and may even lead to overall fragility during higher levels of competition. Low competition seems to be an opportunity to benefit from environmental strategies. We do not see any significant impact of environmental practices on bank stability in developing countries. These countries are still new to sustainable practices and developing such strategies, so there is much room for improvement in overall sustainability. Furthermore, banks in developing countries can have a competitive advantage over banks or firms that are still behind in such practices or consider such practices a competition strategy and investment, rather than considering their costs.

**<< Insert Figure 1-3 about here >>**

## 4.3. Impact of COVID-19

We explore the moderating role of competition at a time when the global banking sector experienced a severe exogenous shock, COVID-19. We do this by introducing a three-way interaction term into the model. Table 6 gives the findings from model (4). The results show that during COVID-19 the impact of competition on stability is positive, suggesting that the competition-stability view prevailed. Competition enhances stability during such times of shock. Environmental practices have no impact during COVID-19 and are found to be of no significance during such severe shocks. To differentiate the moderating role of competition during the pandemic, we plot the marginal effects in Figures 4 to 6 for the full sample, developed and developing economies. Figure 1 shows that during COVID-19 competition played a negative role, and the impact of environmental practices was negative during high competition and positive during low competition. The difference between the findings in Table 6 and Table 5 is the difference in the magnitude of the impact of environmental practices on stability during low competition. The impact of environmental practices is more significant during low competition than that shown in Figure 1. This suggests that lower competition plays an even more prominent role during such shocks, and economies with lower competition can leverage environmental practices to stay afloat. For developed economies, shown in Figure 5, banks only experience impact during high

competition, which is negative, with no noticeable impact during moderate or low competition. During a crisis, environmental practices might become a burden within a competitive banking sector, resulting in lower stability. Figure 6 shows that developing economies experienced no significant impact of COVID-19.

**<< Insert Table 6 about here >>**

**<< Insert Figure 4-6 about here >>**

## 4.4. Endogeneity Concerns

One might argue that the impact of environmental practices is endogenous, and that employing OLS might lead to biased findings in such settings. Furthermore, bank stability is argued to be persistent and called dynamic due to long-term lending and financing decisions and banking regulations (Islam et al., 2020; Karadima & Louri, 2020; Noman et al., 2018). Persistence in dependent variables is an issue that needs to be addressed when conducting studies such as ours. We add a lagged dependent variable as an explanatory variable in the regression model (1-4); however, the model might suffer from correlation between the lagged dependent variable and the error term. To address this problem, we employ a robust estimator, the two-step system generalized method of moments (GMM) (Arellano & Bover, 1995; Blundell & Bond, 1998). This enables us to use instruments for potential endogenous variables (environmental practices, competition, other bank-level characteristics, country-level variables, and COVID-19). GMM provides robust estimates using lagged values as instruments (Kuc & Teplý, 2022). This leads the GMM estimator to introduce instruments from the lagged values of the explanatory variables to the model. Including too many instruments might result in standard errors from downward bias during the two-step estimation, and we therefore employ Windmeijer's (2005) correction. We cluster the standard errors at the country level to avoid correlation within clusters. We apply various diagnostics to validate the results of the baseline models. For all estimations (Table 7), the significant Arell-Bond (1) shows the existence of 1st-order serial autocorrelation, which is corrected in second-order with insignificant Arell-Bond (2) values. The number of instruments is less than the number of groups, suggesting there is no problem with instrument proliferation. The insignificant values of the Hansen test show that the instruments used in the analysis are valid, and there are no concerns about the over-identification of instruments. Table 7 presents the regression

results from re-estimating models (1-4) with GMM. The results are overall consistent with our earlier findings, providing credence to the results reported in Tables 4, 5, and 6.

**<< Insert Table 7 about here >>**

## 4.5. Using the MSCI scores

We further explore the models using environmental practice data from the Morgan Stanley Capital International (MSCI) Intangible Value Assessment (IVA) database. To have a reliable dataset, the data is limited to at least four years of bank observations; we use consolidated information if available; otherwise, to not lose the information, we use unconsolidated information. Finally, we drop the banks without information on environmental practices and/or components of the Lerner index. The final dataset with MSCI scores consists of 448 banks from 64 economies for 2007-16, further split using the World Economic Situation and Prospects (2023). The final dataset consists of banks from 27 developed and 37 developing economies. We use a dummy variable for the global financial crisis period, which has a value of 1 if the period is 2008-09 and 0 otherwise. For brevity, the focus here is on the robustness checks of the core relationships of the study.

Table 8 gives the regression results from equations (1) and (2) using system GMM. The three (03) models in panel A show the relationship between environment ratings and bank stability (equation (1)). In panel B, we repeat the same regression analysis considering competition (equation (2)). We also bring an extra change to the model with other variable specifications to further check robustness. The results suggest that environmental ratings negatively impact overall banking stability. This is true for the full sample of developing and developed countries.

a comprehensive environmental strategy comes with various costs. These include prevention costs, appraisal costs, internal failure costs, and external failure costs associated with addressing hazardous emissions. Also, there are concerns regarding the financial implications of restructuring supply chains to foster better relationships and address ethical issues (Miles & Russell, 1997). Such changes could potentially result in decreased profitability, efficiency, and overall instability. This makes it more challenging for banks to achieve higher sustainability practices with extra costs. Interestingly, the magnitude of the impact is lower for developed economies and rises for developing economies when competition is considered (Panel B). For developing countries, the

results become negative, which aligns with studies that argue that sustainable practices lead to overall image building and reputation, which help attract customers and investors. This change in impact shows that competition might have a role to play in the relationship between environmental investment and stability.

Given the importance of the environment and bank stability, we add credence to the above findings by estimating equations (1) and (2) with differenced GMM (DGMM) estimators, and the results are given in Panels A and B of Table 8, respectively. For concision, we focus on the core variables of environment, competition, and stability. The robustness check results shown in Table 8 align with the findings given in Table 4. Again, the environment negatively impacts overall banking sector stability, suggesting the costly nature of sustainability practices. When we introduce competition into the model, the relationship becomes positive for developing countries (Panel B). Banks might use such environmental practices to build their reputation, branding, and image. Customers and investors today prefer environmentally responsible companies and greener practices. This again suggests that competition might have something to do with the relationship between the environment and stability.

**<< Insert Table 8 about here >>**

Table 9 presents the results of the robustness check for the results reported in Table 5, estimating equation (3) with differenced GMM using MSCI scores. These results are also in line with earlier findings, which add reliability to the results given in Table 5. For the full sample, the interaction term is negative, positive for developing countries, and negative for developed countries (inverse interpretation of market power). Once again, this suggests that banks in developed countries might not be able to benefit from environmental practices. If these banks keep investing in such practices during higher competition, such competition might lead to overall bank fragility. On the other hand, banks in developing economies can benefit more from environmentally sustainable practices when there is higher competition. Considering this moderating role, it can be argued that in developing countries environmentally sustainable practices and competition complement each other on the way to enhanced stability.

**<< Insert Table 9 about here >>**

# 5. Conclusion and Recommendations

Over the past few decades, the relationship between environmental and financial performance has garnered attention due to environmental alarms and their consequences for business. The nexus between environmental and financial performance is a dynamic area of research focusing on the importance of environmental factors that affect companies' financial health. This effect might be made worse by peer pressure and competition. We test the impact of environmental investment on bank stability and competition on bank stability. We dive into the research area to explore the impact of environmental investment at various levels of competition, to find if competition can shape the relationship between environmental investment and stability/fragility. We do this by using two datasets of environmental scores from Thomson Reuters's Refinitiv LSEG database and MSCI scores. The findings are fascinating. Environmental investments have been found to result in fragility. However, the results change for developed countries when competition is considered. This suggests that competition might play a deeper role in developing countries. Testing this intersection further, competition negatively moderates the impact of environmental investment on stability in developed economies, and the moderation is positive for developing economies. Since climate change is one of the main concerns of the day, it is crucial to align environmental practices with overall bank policies and to integrate environmental practice into operational activity with extra care, so it does not become a cost. It is a wake-up call for the banking industry to reevaluate their environmental practices and work responsibly. Regulatory authorities must warrant banks to compete on a level playing field, adhere to responsible lending practices, and observe risk management. A competitive banking sector with robust laws can offer a dynamic and resilient financial sector (Anarfo et al., 2020). If prudent regulations do not curtail excessive competition in the industry, it can create chaos, leading to financial crises. Striking the right balance between competition and stability is a challenging task for regulators and policymakers (Fang et al., 2019).These findings are significant for banks in developed and developing economies. Based on our findings, we make the following recommendations.

Firstly, banks in developed countries should develop a strategy focusing on a moderate level of environmental investment so that these investments do not burden financial statements. It seems that banks in developing countries are still realizing the need for environmental investment for

better financial stability. Thus, they can capitalize on sustainable practices to attract more investors and customers simultaneously. Secondly, competition seems more significant in developed economies, resulting in bank fragility. Regulators and policymakers are encouraged to carefully monitor levels of competition and consider mergers and acquisitions, if possible, to control banking sector competition before it leads to an overall sectoral crisis. Thirdly, considering market competition is essential when developing policies for environmental investment. Bank management should opt for different environmental strategies at different levels of competition. For example, Figures 1 to 3 show that competition has varying degrees of impact on the relationship between environmental investment and stability. For the full sample and developed economies, the impact is negative at a high level of competition and insignificant at a low level of competition. For developing countries, the impact is the opposite. It is positive at high and harmful at low levels of competition. This shows that developed and developing countries should have different approaches when designing policies for environmental investment. Our study is limited to environmental investment, and future studies should consider other important sustainability factors. Input from stakeholders might be an essential factor driving such strategies for banks.

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**Table 1**: Details of the study variables.

| Variable | Symbol | description | Expected relationship | Source |
|---|---|---|---|---|
| Dependent Variables | | | | |
| Stability | ZSC | Sum of the equity ratio and total assets divided by the 4-years rolling standard deviation of ROA (sdROA). | | Authors' FC* |
| Competition | LENR | Market power, used as an inverse measure of competition | + | Authors' FC |
| Environmental practices | EN | Environment financing (scale 0-10) | + | LSEG and MSCI (for robustness) |
| Equity ratio | EA | The ratio of equity/total assets | +/- | FC |
| Diversification | DIVE | Non-interest income/total assets | + | |
| Size | BSZ | Log of banks assets in total | + | FC |
| Bank profitability | ROA | Net income/total assets | + | FC |
| Share of deposits | MSdp | Bank deposits/total bank sector deposits | +/- | FC |
| Efficiency | CIR | Operating expenses/income | | FC |
| Margins | NIM | Net interest income/total earning assets, | | FC |
| Market concentration | HHIa | Market structure (of assets) | +/- | Author's |
| COVID-19 | COVID | Dummy variable takes a value of 1 for the year 2020 and 0 otherwise | - | |
| GDP growth rate | GDG | Annual GDP growth rate | + | WDI** |
| Inflation rate | INFN | Inflation rate | + | WDI |

Note: * Fitch Connect. **World Bank Development Indicators

**Table 2:** Summary statistics.

| Variable | No. of Obs. | Mean | Standard Dev. | Minimum | Maximum |
|---|---|---|---|---|---|
| LZSC | 2,708 | 4.23 | 1.08 | -0.92 | 8.44 |
| EN | 2,475 | 42.00 | 31.79 | 0.00 | 97.14 |
| LERN | 2,685 | 0.33 | 0.12 | -0.75 | 0.90 |
| EA | 2,749 | 0.12 | 0.09 | 0.03 | 0.92 |
| DIVE | 2,749 | 0.28 | 0.34 | -1.50 | 13.05 |
| BSZ | 2,749 | 10.39 | 1.64 | 3.94 | 15.17 |
| ROA | 2,749 | 1.20 | 1.85 | -35.91 | 58.85 |
| MSdp | 2,749 | 0.18 | 0.28 | 0.00 | 1.00 |
| CIR | 2,749 | 0.54 | 0.35 | -6.26 | 15.00 |
| NIM | 2,735 | 3.24 | 2.81 | -10.12 | 55.36 |
| HHIa | 2,749 | 0.33 | 0.24 | 0.11 | 1.00 |
| GDG | 2,579 | 2.34 | 2.95 | -17.67 | 15.84 |
| INFN | 2,521 | 2.99 | 4.50 | -2.54 | 72.31 |

Note: ZSC denotes bank stability, the zscore. EN is banks' environmental practices. LENR is the Lerner index, the inverse measure for competition, and should be interpreted accordingly. EA is the capital ratio. DIVE is income diversification. BSZ is a log of the bank's total asset size. ROA is profitability. MSdp shows the market share of deposits. CIR shows bank efficiency. NIM shows the bank interest margins, and HHIa is the market structure measured with bank assets. GDG and INFN are the GDP growth rate and inflation rate, respectively. Bold indicates a significant correlation.

**Table 3:** The correlations matrix.

| | LZSC | EN | LENR | EA | DIVE | BSZ | ROA | MS_dp | CIR | NIM | HHIa | GDG | INFN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LZSC | 1.00 | | | | | | | | | | | | |
| EN | **-0.15** | 1.00 | | | | | | | | | | | |
| LENR | **0.20** | **-0.09** | 1.00 | | | | | | | | | | |
| EA | **0.14** | **-0.34** | **0.33** | 1.00 | | | | | | | | | |
| DIVE | **-0.06** | **0.17** | **-0.23** | **-0.06** | 1.00 | | | | | | | | |
| BSZ | **-0.09** | **0.59** | 0.02 | **-0.44** | **0.14** | 1.00 | | | | | | | |
| ROA | **0.18** | **-0.10** | **0.49** | **0.50** | -0.02 | **-0.14** | 1.00 | | | | | | |
| MSdp | **-0.05** | **0.48** | -0.01 | **-0.20** | **0.06** | **0.36** | -0.01 | 1.00 | | | | | |
| CIR | **-0.12** | **0.04** | **-0.51** | **-0.19** | **-0.45** | **0.00** | **-0.33** | **-0.06** | 1.00 | | | | |
| NIM | -0.02 | **-0.20** | **0.23** | **0.46** | **-0.20** | **-0.36** | **0.52** | -0.04 | **-0.18** | 1.00 | | | |
| HHIa | -0.01 | **0.31** | **-0.05** | **-0.09** | **0.07** | **0.09** | -0.01 | **0.74** | -0.02 | **-0.10** | 1.00 | | |
| GDG | **0.05** | 0.04 | 0.03 | **0.04** | -0.02 | -0.04 | **0.19** | 0.00 | **-0.05** | **0.16** | **-0.09** | 1.00 | |
| INFN | **-0.19** | **0.14** | 0.01 | -0.01 | -0.02 | 0.03 | **0.34** | **0.07** | **-0.08** | **0.39** | 0.00 | **0.21** | 1.00 |

Note: ZSC denotes bank stability, the zscore. EN is banks' environmental practices. LENR is the Lerner index, the inverse measure for competition, and should be interpreted accordingly. EA is the capital ratio. DIVE is income diversification. BSZ is a log of the bank's total asset size. ROA is profitability. MSdp shows the market share of deposits. CIR shows bank efficiency. NIM shows the bank interest margins, and HHIa is the market structure measured with bank assets. GDG and INFN are the GDP growth rate and inflation rate respectively. Bold indicates a significant correlation.

**Table 4**: Impact of environmental sustainability on stability.

| | Panel A | | | Panel B | | |
|---|---|---|---|---|---|---|
| | Full sample | Developed Economies | Developing Economies | Full sample | Developed Economies | Developing Economies |
| Model | 1 | 1 | 1 | 2 | 2 | 2 |
| | LZS | LZS | LZS | LZS | LZS | LZS |
| L.EN | -0.0033*** | -0.0042** | -0.0001 | -0.0017 | -0.0040** | 0.0003 |
| | (0.007) | (0.010) | (0.943) | (0.168) | (0.014) | (0.884) |
| L.LERN | | | | 0.8506*** | 1.0057*** | -0.6089 |
| | | | | (0.001) | (0.000) | (0.266) |
| L.EA | 0.1696 | -0.5431 | 0.6078 | -0.3832 | -0.3676 | -0.1203 |
| | (0.811) | (0.729) | (0.475) | (0.730) | (0.816) | (0.945) |
| L.DIVE | 0.2832 | -0.6050** | 0.3371 | -0.4688* | -0.6807** | 0.0199 |
| | (0.164) | (0.039) | (0.353) | (0.071) | (0.021) | (0.973) |
| L.BSZ | -0.0788*** | -0.0561 | 0.0149 | -0.0844*** | -0.0661* | -0.0339 |
| | (0.009) | (0.130) | (0.795) | (0.006) | (0.079) | (0.569) |
| L.ROA | -0.0025 | 0.2871*** | -0.0318* | 0.3137*** | 0.2906*** | 0.3892*** |
| | (0.888) | (0.000) | (0.085) | (0.000) | (0.000) | (0.000) |
| L.MSdp | 0.0939 | -0.1665 | 0.1439 | 0.1050 | -0.0849 | 0.2973 |
| | (0.684) | (0.605) | (0.659) | (0.648) | (0.793) | (0.355) |
| L.CIR | -0.4588*** | -0.3322 | -0.4952* | -0.0144 | -0.1195 | -0.3326 |
| | (0.006) | (0.239) | (0.093) | (0.949) | (0.695) | (0.375) |
| L.NIM | -0.0232 | -0.1017* | -0.0315 | -0.0859** | -0.1479*** | -0.0914** |
| | (0.361) | (0.068) | (0.280) | (0.010) | (0.009) | (0.032) |
| L.HHa | 0.1646 | 0.3818 | 0.1264 | 0.1336 | 0.2914 | -0.2625 |
| | (0.514) | (0.270) | (0.739) | (0.594) | (0.402) | (0.480) |
| L.GDG | 0.0234*** | 0.0350*** | 0.0114 | 0.0134* | 0.0274*** | 0.0018 |
| | (0.001) | (0.001) | (0.219) | (0.053) | (0.008) | (0.851) |
| L.INFN | -0.0442*** | -0.1028*** | -0.0282*** | -0.0525*** | -0.0940*** | -0.0441*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| COVID | -0.4316*** | -0.4443*** | -0.5228*** | -0.4622*** | -0.4479*** | -0.5514*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Constant | 5.3886*** | 5.4587*** | 4.2941*** | 5.0453*** | 5.2537*** | 4.9757*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 1993 | 1354 | 639 | 1969 | 1344 | 625 |

Note: ZSC denotes bank stability, the zscore. EN is banks' environmental practices. LENR is the Lerner index, the inverse measure for competition, and should be interpreted accordingly. EA is the capital ratio. DIVE is income diversification. BSZ is a log of the bank's total asset size. ROA is profitability. MSdp shows the market share of deposits. CIR shows bank efficiency. NIM shows the bank interest margins, and HHIa is the market structure measured with bank assets. GDG and INFN are the GDP growth rate and inflation rate, respectively. COVID shows the COVID-19 period dummy. P-values in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

**Table 5**: Impact of environmental sustainability on stability in the presence of competition.

| | Full sample | Developed Economies | Developing Economies |
|---|---|---|---|
| | LZS | LZS | LZS |
| L.LERN | -2.0049*** | -2.1076** | -1.4209 |
| | (0.001) | (0.015) | (0.125) |
| L.EN | -0.0109*** | -0.0142*** | 0.0003 |
| | (0.000) | (0.000) | (0.958) |
| L.LERN*L.EN | 0.0252*** | 0.0296*** | -0.0001 |
| | (0.000) | (0.001) | (0.992) |
| L.EA | 0.9489 | 0.3909 | 0.5117 |
| | (0.398) | (0.805) | (0.774) |
| L.DIVE | -0.4513* | -0.6420** | 0.0817 |
| | (0.079) | (0.028) | (0.888) |
| L.BSZ | -0.0415 | -0.0153 | -0.0166 |
| | (0.183) | (0.690) | (0.777) |
| L.ROA | 0.3343*** | 0.2951*** | 0.4156*** |
| | (0.000) | (0.000) | (0.000) |
| L.MSdp | 0.0561 | -0.2716 | 0.3035 |
| | (0.804) | (0.394) | (0.338) |
| L.CIR | -0.6340 | -0.7405 | -0.9178* |
| | (0.106) | (0.273) | (0.095) |
| L.NIM | -0.0779** | -0.0968* | -0.0934** |
| | (0.018) | (0.081) | (0.026) |
| L.HHIa | 0.1622 | 0.4605 | -0.2675 |
| | (0.509) | (0.177) | (0.458) |
| L.GDG | 0.0142** | 0.0329*** | 0.0040 |
| | (0.040) | (0.002) | (0.666) |
| L.INFN | -0.0574*** | -0.0993*** | -0.0442*** |
| | (0.000) | (0.000) | (0.000) |
| COVID | -0.4947*** | -0.4801*** | -0.6006*** |
| | (0.000) | (0.000) | (0.000) |
| Constant | 5.7623*** | 5.8773*** | 5.2495*** |
| | (0.000) | (0.000) | (0.000) |
| Observations | 1969 | 1344 | 625 |

Note: ZSC denotes bank stability, the zscore. EN is banks' environmental practices. LENR is the Lerner index, the inverse measure for competition, and should be interpreted accordingly. EA is the capital ratio. DIVE is income diversification. BSZ is a log of the bank's total asset size. ROA is profitability. MSdp shows the market share of deposits. CIR shows bank efficiency. NIM shows the bank interest margins, and HHIa is the market structure measured with bank assets. GDG and INFN are the GDP growth rate and inflation rate, respectively. COVID shows the COVID-19 period dummy. P-values in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

**Table 6**: Impact of environmental sustainability on stability in the presence of competition during COVID-19.

| | Full sample | Developed Economies | Developing Economies |
|---|---|---|---|
| | LZS | LZS | LZS |
| L.LERN | -0.2021 | 0.7382 | 0.7728 |
| | (0.786) | (0.498) | (0.501) |
| L.EN | -0.0083 | -0.0095 | -0.0016 |
| | (0.101) | (0.117) | (0.816) |
| L.LERN*L.EN | 0.0147 | 0.0138 | 0.0031 |
| | (0.186) | (0.313) | (0.850) |
| COVID | -0.1169 | -0.0066 | -0.6638 |
| | (0.696) | (0.988) | (0.115) |
| COVID*L.Lerner | -1.6338** | -1.7922 | -0.6584 |
| | (0.038) | (0.136) | (0.525) |
| COVID*L.EN | -0.0078 | -0.0094 | -0.0046 |
| | (0.115) | (0.173) | (0.550) |
| COVID*L.LERN* L.EP | 0.0255* | 0.0311 | 0.0203 |
| | (0.081) | (0.145) | (0.328) |
| L.EA | 2.1700* | 1.7894 | 1.3789 |
| | (0.099) | (0.309) | (0.522) |
| L.DIVE | -0.3641 | -0.3700 | -0.9108 |
| | (0.318) | (0.359) | (0.288) |
| L.BSZ | -0.0159 | -0.0301 | -0.0475 |
| | (0.654) | (0.459) | (0.741) |
| L.ROA | 0.2772*** | 0.2743*** | 0.2923*** |
| | (0.000) | (0.000) | (0.005) |
| L.MSdp | 0.4710* | 0.4856 | 0.4514 |
| | (0.051) | (0.180) | (0.237) |
| L.CIR | 0.0608 | 0.6085 | 0.2996 |
| | (0.895) | (0.436) | (0.656) |
| L.NIM | -0.1463*** | -0.3242*** | -0.0905 |
| | (0.010) | (0.002) | (0.215) |
| L.HHIa | 0.6988 | 0.2714 | 0.5850 |
| | (0.173) | (0.840) | (0.247) |
| L.GDG | -0.0090 | 0.0497** | -0.0365** |
| | (0.464) | (0.035) | (0.018) |
| L.INFN | -0.0374*** | -0.0776*** | -0.0395*** |
| | (0.000) | (0.002) | (0.000) |
| Constant | 4.7308*** | 4.8288*** | 0.0000 |
| | (0.000) | (0.000) | (.) |
| Observations | 1969 | 1344 | 625 |

Note: ZSC denotes bank stability, the zscore. EN is banks' environmental practices. LENR is the Lerner index, the inverse measure for competition, and should be interpreted accordingly. EA is the capital ratio. DIVE is income diversification. BSZ is a log of the bank's total asset size. ROA is profitability. MSdp shows the market share of deposits. CIR shows bank efficiency. NIM shows the bank interest margins, and HHIa is the market structure measured with bank assets. GDG and INFN are the GDP growth rate and inflation rate, respectively. COVID shows the COVID-19 period dummy. P-values in parentheses . * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

**Table 7**: Impact of environmental sustainability on stability using SGMM.

| Model # | 01 | | | 02 | | | 03 | | | 04 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aligned with Table # | 04 | | | 04 | | | 05 | | | 06 | | |
| | Full sample | Developed Economies | Developing Economies | Full sample | Developed Economies | Developing Economies | Full sample | Developed Economies | Developing Economies | Full sample | Developed Economies | Developing Economies |
| | LZS | LZS | LZS | LZS | LZS | LZS | LZS | LZS | LZS | LZS | LZS | LZS |
| L.LZS | 0.6059*** | 0.5752*** | 0.6033*** | 0.4524*** | 0.4907*** | 0.5092*** | 0.4182*** | 0.4741*** | 0.5455*** | 0.5628*** | 0.3373*** | 0.3373*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| L.EN | -0.0059*** | -0.0101*** | -0.0120 | -0.0024*** | -0.0061*** | -0.0064 | -0.0133*** | -0.0184*** | -0.0243 | -0.0103*** | 0.0203 | 0.0203 |
| | (0.000) | (0.000) | (0.202) | (0.000) | (0.000) | (0.463) | (0.000) | (0.000) | (0.160) | (0.000) | (0.126) | (0.126) |
| L.EA | 2.2777*** | -2.4741*** | 6.0614*** | 2.5797*** | -2.5443*** | -7.0373 | 2.3540*** | -0.5011 | -4.6121 | 1.7625*** | -14.3774*** | -14.3774*** |
| | (0.000) | (0.000) | (0.002) | (0.000) | (0.000) | (0.380) | (0.000) | (0.336) | (0.530) | (0.000) | (0.003) | (0.003) |
| L.DIVE | -0.4884*** | -0.0637 | -0.1947 | -1.6990*** | -0.9111*** | 3.6300* | -1.7402*** | -0.8515*** | 2.4578 | -0.0248 | 1.9671 | 1.9671 |
| | (0.000) | (0.294) | (0.804) | (0.000) | (0.000) | (0.088) | (0.000) | (0.000) | (0.210) | (0.770) | (0.125) | (0.125) |
| L.BSZ | 0.0389*** | 0.0678*** | 0.6156*** | 0.0365*** | 0.0765*** | 0.1163 | 0.0953*** | 0.1141*** | 0.3103 | 0.0533*** | -0.2796 | -0.2796 |
| | (0.000) | (0.000) | (0.005) | (0.000) | (0.000) | (0.699) | (0.000) | (0.000) | (0.287) | (0.000) | (0.123) | (0.123) |
| L.ROA | -0.0155*** | 0.0619*** | -0.0376*** | -0.1244*** | 0.0306 | 0.9181** | -0.0598** | 0.0744*** | 0.8377** | 0.0576*** | 0.5839** | 0.5839** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.207) | (0.029) | (0.012) | (0.000) | (0.019) | (0.000) | (0.011) | (0.011) |
| L.MSdp | -0.0953*** | 0.1117 | 0.1152 | 0.1730*** | -0.9422*** | 0.5403 | 0.3607*** | -1.0328*** | 0.6163 | 0.0720 | 0.4344 | 0.4344 |
| | (0.002) | (0.154) | (0.900) | (0.000) | (0.000) | (0.778) | (0.000) | (0.000) | (0.682) | (0.207) | (0.459) | (0.459) |
| L.CIR | 0.2363*** | -0.2639*** | -0.0115 | 0.2528*** | 0.6882*** | 2.0489 | 0.8103*** | 1.6487*** | 3.9361 | 0.1707 | -0.5340 | -0.5340 |
| | (0.000) | (0.000) | (0.985) | (0.001) | (0.000) | (0.423) | (0.000) | (0.000) | (0.160) | (0.181) | (0.750) | (0.750) |
| L.NIM | -0.0461*** | -0.1016*** | -0.0183 | -0.0027 | 0.0238 | 0.1928 | -0.0208** | 0.0444*** | 0.1978* | -0.0520*** | 0.2858*** | 0.2858*** |
| | (0.000) | (0.000) | (0.763) | (0.632) | (0.216) | (0.106) | (0.049) | (0.000) | (0.085) | (0.000) | (0.010) | (0.010) |
| L.HHIa | 0.3680*** | -0.1797* | 2.6930 | -0.0978** | 1.0338*** | 1.0466 | 0.0342 | 1.1965*** | 1.5072 | 0.5255*** | 0.1397 | 0.1397 |
| | (0.000) | (0.062) | (0.196) | (0.039) | (0.000) | (0.559) | (0.712) | (0.000) | (0.372) | (0.000) | (0.859) | (0.859) |
| L.GDG | 0.0073*** | 0.0511*** | -0.0180 | 0.0017 | 0.0637*** | -0.0460 | 0.0051 | 0.0620*** | -0.0562 | 0.0034 | -0.0346** | -0.0346** |
| | (0.000) | (0.000) | (0.737) | (0.396) | (0.000) | (0.353) | (0.279) | (0.000) | (0.112) | (0.176) | (0.030) | (0.030) |
| L.INFN | -0.0073*** | -0.0589*** | -0.0024 | -0.0154*** | -0.0549*** | -0.0783*** | -0.0205*** | -0.0553*** | -0.0719*** | -0.0153*** | -0.0957*** | -0.0957*** |
| | (0.000) | (0.000) | (0.807) | (0.000) | (0.000) | (0.001) | (0.000) | (0.000) | (0.001) | (0.000) | (0.000) | (0.000) |
| COVID | | -0.6283*** | -0.7162** | -0.2301*** | | -1.2287*** | -0.2072*** | -0.5181*** | -1.1261*** | 0.1776*** | 0.8486 | 0.8486 |
| | | (0.000) | (0.022) | (0.000) | | (0.006) | (0.000) | (0.000) | (0.001) | (0.006) | (0.515) | (0.515) |
| L.LERN | | | | 0.8155*** | 0.5064* | -1.5676 | 0.1533 | -0.3083* | -1.7492 | -0.4626** | 3.8793** | 3.8793** |
| | | | | (0.000) | (0.061) | (0.624) | (0.447) | (0.058) | (0.547) | (0.019) | (0.036) | (0.036) |
| L.LERN * L.EN | | | | | | | 0.0272*** | 0.0405*** | 0.0400 | 0.0177*** | -0.0378 | -0.0378 |
| | | | | | | | (0.000) | (0.000) | (0.206) | (0.000) | (0.197) | (0.197) |
| COVID * L.LENR | | | | | | | | | | -1.0619*** | -3.2605 | -3.2605 |
| | | | | | | | | | | (0.000) | (0.379) | (0.379) |
| COVID * L.EN | | | | | | | | | | -0.0100*** | -0.0128 | -0.0128 |
| | | | | | | | | | | (0.000) | (0.612) | (0.612) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COVID * L.LENR * L.EN | | | | | | | | | | 0.0170*** | 0.0439 | 0.0439 |
| | | | | | | | | | | (0.000) | (0.555) | (0.555) |
| Constant | 0.7969*** | 2.3105*** | -5.9831** | 1.7421*** | 1.2667*** | -0.9686 | 1.1707*** | 0.2944*** | -4.0008 | 1.1008*** | 3.4962 | 3.4962 |
| | (0.000) | (0.000) | (0.041) | (0.000) | (0.000) | (0.807) | (0.000) | (0.008) | (0.344) | (0.000) | (0.188) | (0.188) |
| Observations | 1983 | 1349 | 634 | 1960 | 1339 | 621 | 1960 | 1339 | 621 | 1960 | 1339 | 621 |
| instruments | 234.0000 | 164.0000 | 44.0000 | 242.0000 | 158.0000 | 37.0000 | 208.0000 | 172.0000 | 40.0000 | 205.0000 | 36.0000 | 51.0000 |
| overall | 256.0000 | 173.0000 | 83.0000 | 254.0000 | 173.0000 | 81.0000 | 254.0000 | 173.0000 | 81.0000 | 254.0000 | 173.0000 | 81.0000 |
| Arellano-Bond:AR(1) | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0207 | 0.0000 |
| Arellano-Bond: AR(2) | 0.7317 | 0.2454 | 0.1070 | 0.1320 | 0.3441 | 0.6064 | 0.2522 | 0.2536 | 0.6094 | 0.8265 | 0.1241 | 0.2365 |
| Hansen Test (p-Val) | 0.2150 | 0.3416 | 0.1310 | 0.1811 | 0.1701 | 0.5074 | 0.1779 | 0.2786 | 0.6773 | 0.1136 | 0.5896 | 0.6988 |

Note: ZSC denotes bank stability, the zscore. EN is the bank's environmental practices. LENR is the Lerner index, the inverse measure for competition, and should be interpreted accordingly. EA is the capital ratio. DIVE is income diversification. BSZ is a log of the bank's total asset size. ROA is profitability. MSdp shows the market share of deposits. CIR shows bank efficiency. NIM shows the bank interest margins, and HHIa is the market structure measured with bank assets. GDG and INFN are the GDP growth rate and inflation rate, respectively. COVID shows the COVID-19 period dummy. P-values in parentheses $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

**Table 8:** Robustness with MSCI Scores: Impact of environmental sustainability on stability.

| | Panel A | | | Panel B | | |
|---|---|---|---|---|---|---|
| | **Full sample** | **Developing Economies** | **Developed Economies** | **Full sample** | **Developing Economies** | **Developed Economies** |
| | LZSC | LZSC | LZSC | LZSC | LZSC | LZSC |
| L. LZSC | 0.4263*** | 0.3325*** | 0.4402*** | 0.3719*** | 0.2888*** | 0.4645*** |
| | (0.026) | (0.010) | (0.012) | (0.061) | (0.063) | (0.012) |
| EN | -0.0616*** | -0.0414*** | -0.1545*** | -0.1065*** | 0.1313* | -0.0716*** |
| | (0.016) | (0.012) | (0.011) | (0.040) | (0.072) | (0.009) |
| BSZ | 1.4214*** | 0.4948*** | 0.7885*** | 1.4562*** | 0.3893 | 1.2747*** |
| | (0.180) | (0.055) | (0.098) | (0.312) | (0.448) | (0.079) |
| EA | 12.5939*** | 23.0859*** | 7.9665*** | 11.8462** | 17.6213*** | 20.3994*** |
| | (1.479) | (1.638) | (0.500) | (5.706) | (6.366) | (1.626) |
| DIVE | 0.0016*** | 1.5829*** | 0.0011*** | 0.0037 | 0.6371 | -0.0014*** |
| | (0.000) | (0.055) | (0.000) | (0.004) | (0.488) | (0.000) |
| LTA | 0.3869 | 0.4116*** | 2.9426*** | -0.1176 | -1.9470 | 0.8095*** |
| | (0.548) | (0.126) | (0.463) | (1.114) | (1.898) | (0.250) |
| GDG | 0.0074 | -0.0394*** | 0.0041 | -0.0041 | -0.0677*** | 0.0080 |
| | (0.009) | (0.004) | (0.007) | (0.017) | (0.020) | (0.008) |
| INFN | 0.0007 | -0.0026 | 0.0143 | 0.0006 | -0.0070* | 0.0312*** |
| | (0.004) | (0.003) | (0.021) | (0.004) | (0.004) | (0.011) |
| Cris | -0.4231*** | -0.9111*** | -0.5768*** | -0.2226** | -1.3409*** | -0.2878*** |
| | (0.067) | (0.059) | (0.057) | (0.111) | (0.330) | (0.062) |
| LENR | | | | 4.8252*** | 1.4648 | 3.0238*** |
| | | | | (0.994) | (1.469) | (0.391) |
| Observ. | 651 | 164 | 487 | 593 | 150 | 443 |
| Instru. | 86 | 55 | 86 | 51 | 65 | 100 |
| Group | 254 | 102 | 152 | 237 | 96 | 141 |
| Arell-Bond (1) | 0.0032 | 0.0442 | 0.0001 | 0.0005 | 0.0912 | 0.0001 |
| Arell-Bond (2) | 0.4520 | 0.5528 | 0.3551 | 0.1198 | 0.5806 | 0.2669 |
| Han-Test | 0.1969 | 0.3684 | 0.4117 | 0.2644 | 0.9623 | 0.5119 |

Note: Panel A shows the results from equation (1) while Panel B shows the results from equation (2). ZSC denotes bank stability, the zscore. EN is banks' environmental investments. LENR is the Lerner index, the inverse measure for competition and it should be inversely interpreted. BSZ is log of banks total asset size. EA is the capital ratio. DIVE is the income diversification. LTA is the extent of banks' lending. GDG and INFN are the GDP growth rate and inflation rate, respectively. Standard errors in parentheses. $^{*}$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$.

**Table 9**: Robustness with MSCI Scores: Impact of environmental sustainability on stability in the presence of competition.

| | Full sample | Developing Economies | Developed Economies |
|---|---|---|---|
| | LZSC | LZSC | LZSC |
| L.LZSC | 0.2458*** | 0.3104*** | 0.3661*** |
| | (0.015) | (0.011) | (0.022) |
| EN | -0.8625*** | 0.2670*** | -0.3018*** |
| | (0.036) | (0.055) | (0.075) |
| LENR | -7.3085*** | 3.0302*** | -1.9403*** |
| | (0.473) | (0.417) | (0.652) |
| EP*LENR | 1.5832*** | -0.4611*** | 0.5481*** |
| | (0.072) | (0.104) | (0.202) |
| BSZ | 1.4241*** | 0.2681*** | 0.1886 |
| | (0.066) | (0.075) | (0.118) |
| EA | 25.1468*** | 25.1541*** | 25.0845*** |
| | (1.493) | (1.895) | (1.855) |
| DIVE | 0.0204*** | 0.8625*** | 0.0156*** |
| | (0.007) | (0.220) | (0.002) |
| LTA | -0.5657*** | 0.3529 | 2.6647*** |
| | (0.190) | (0.697) | (0.288) |
| GDG | -0.0223** | -0.0515*** | -0.0758*** |
| | (0.009) | (0.013) | (0.012) |
| INFN | -0.0011 | -0.0053* | -0.0489*** |
| | (0.002) | (0.003) | (0.013) |
| Cris | -0.3844*** | -0.9709*** | -0.8192*** |
| | (0.114) | (0.229) | (0.108) |
| Observ. | 593 | 150 | 443 |
| Instru. | 87 | 73 | 65 |
| Group | 237 | 96 | 141 |
| Arell-Bond (1) | 0.0002 | 0.0821 | 0.0001 |
| Arell-Bond (2) | 0.1081 | 0.2286 | 0.2784 |
| Han-Test | 0.4999 | 0.9598 | 0.3615 |

Note: The results shown are derived by estimating equation (3). ZSC denotes bank stability, the zscore. EN is banks' environmental investments. LENR is the Lerner index, the inverse measure for competition and it should be inversely interpreted. BSZ is log of banks total asset size. EA is the capital ratio. DIVE is the income diversification. LTA is the extent of banks' lending. GDG and INFN are the GDP growth rate and inflation rate respectively. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

**Figure 1**: Marginal Effects of EN on ZSC as Lerner Index Varies - Full Sample

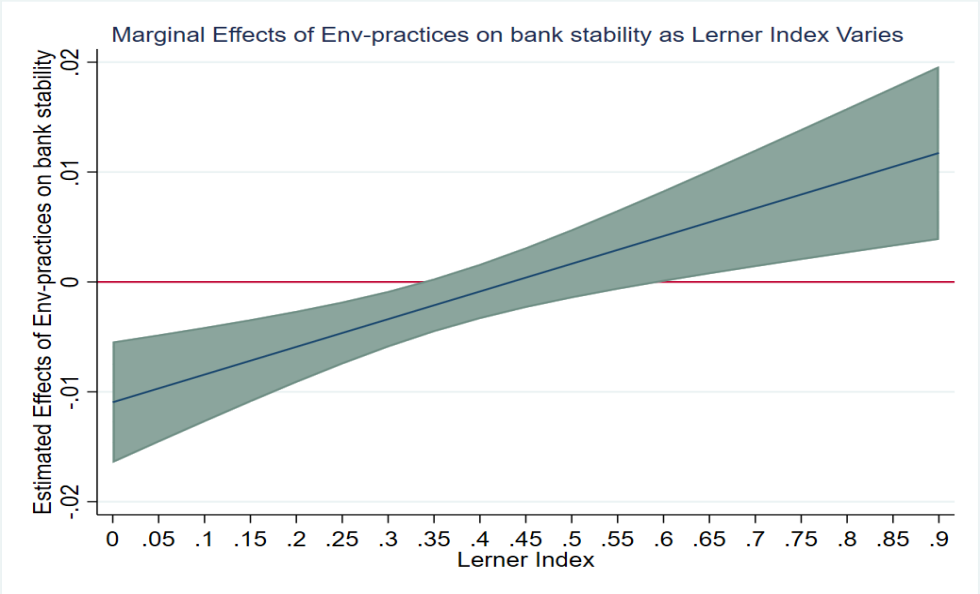


**Figure 2**: Marginal Effects of EN on ZSC as Lerner Index Varies - Developed Countries

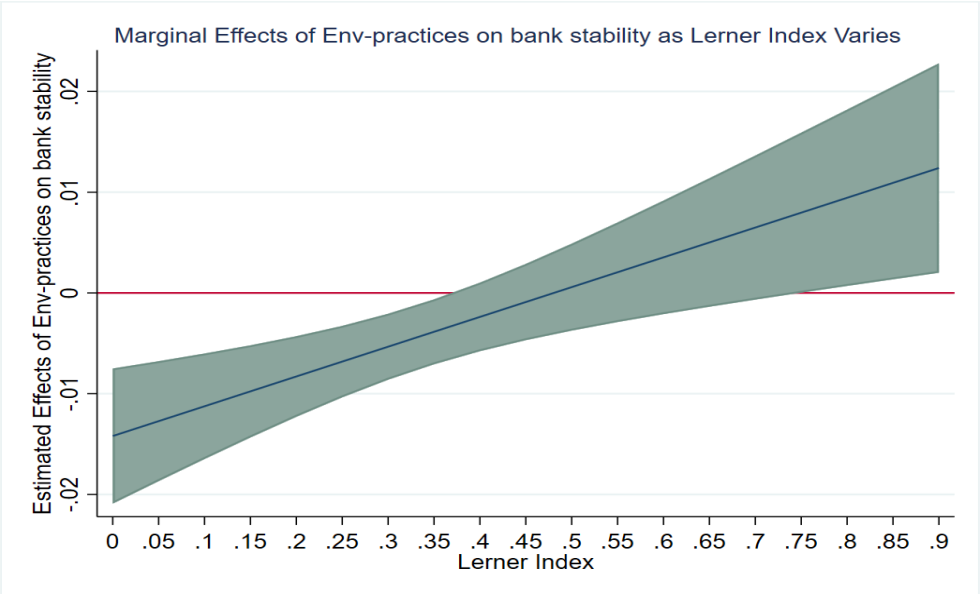

**Figure 3**: Marginal Effects of EN on ZSC as Lerner Index Varies - Developing Countries

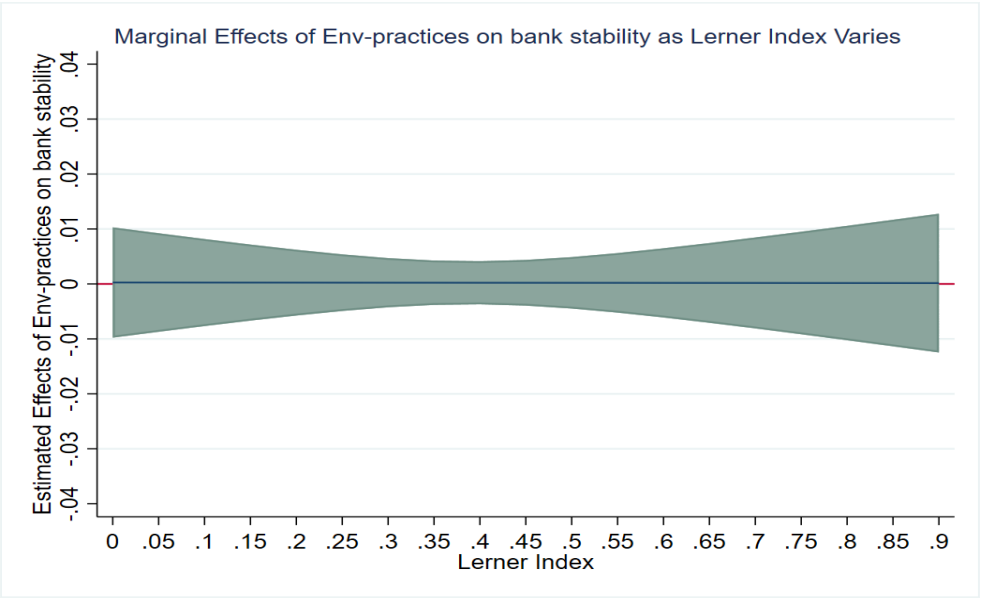


**Figure 4**: Marginal Effects of EN on ZSC as Lerner Index Varies during COVID-19 - Full Sample.

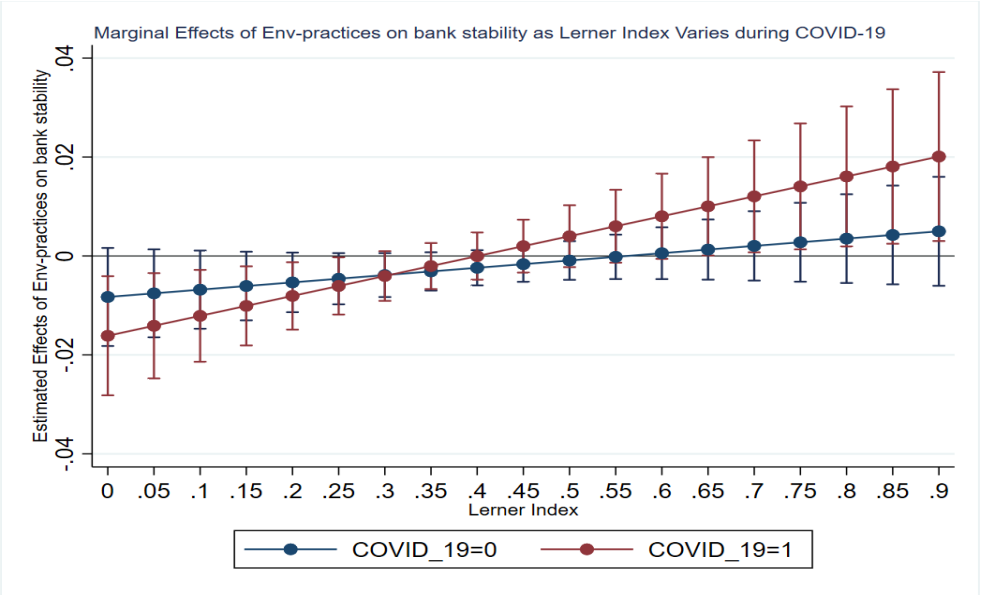

**Figure 5**: Marginal Effects of EN on ZSC as Lerner Index Varies during COVID-19 - Developed Economies.

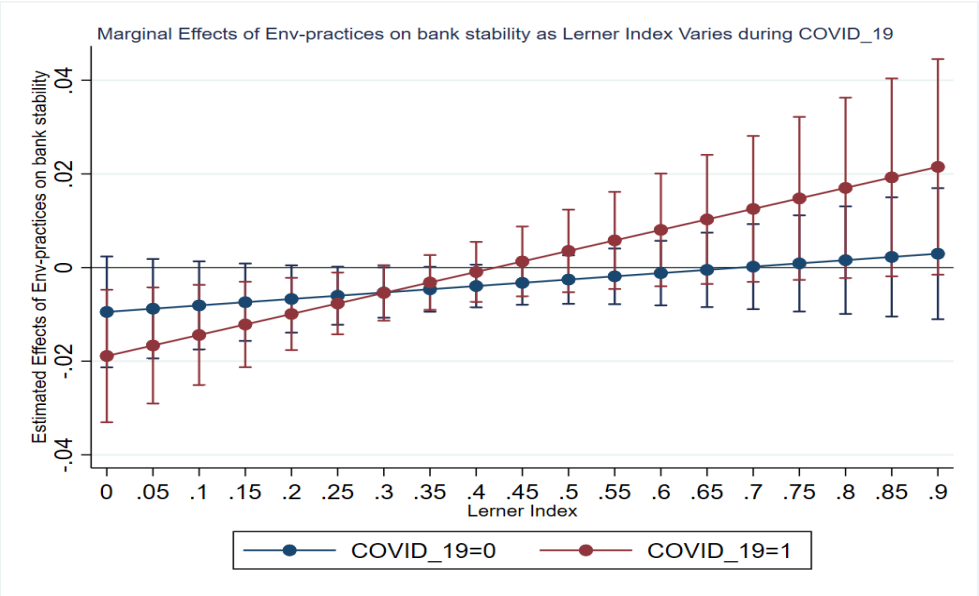


**Figure 6**: Marginal Effects of EN on ZSC as Lerner Index Varies during COVID-19 - Developing Economies.