

Sustainable Banking and Financial stability: A comparative analysis of China and Vietnam

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Abstract. This study investigates the impact of sustainable development practices on the financial stability of commercial banks in China and Vietnam, utilizing the Method of Moments Quantile Regression. The findings reveal non-linear relationships between ESG dimensions and bank stability. Environmental responsibility shows an inverted U-shape in China but a U-shape in Vietnam. Social and governance factors exhibit negative or insignificant impacts. These results highlight how the effectiveness of sustainability practices depends on a bank's size, governance capabilities, and institutional environment. The study offers policy implications for optimizing sustainability strategies to enhance financial stability and provides theoretical contributions to stakeholder theory, resource-based view, and trade-off hypothesis in an emerging markets context.

Keywords: Sustainable banking, ESG, MMQR, CSR, banking sectors, China and Vietnam.

1. Introduction

In the context of the constantly fluctuating global economy, banks play an important role in maintaining economic growth and ensuring financial stability. In particular, sustainable development (SD) has become a strategic factor emphasized in the financial sector, helping to improve operational efficiency, manage risks, and increase organizational reputation (Cornett, M. M., Erhemjamts, O., and Tehranian, H., 2016). However, the extent to which SD enhances financial stability remains an open question, particularly in economies with distinct financial structures and regulatory environments. Theoretical and empirical investigations have yet to establish a consensus on the mechanisms through which SD influences banking stability (Wu, M. W., & Shen, C. H., 2013). This creates a significant gap in research on the role of SD in banking's financial stability across different economic contexts.

To address this gap, this study explicitly formulates the following research questions as the following: (i) How do SD initiatives, particularly corporate social responsibility (CSR) activities, impact the financial stability of banks in China and Vietnam?; (ii) To what extent do governance structures, financial infrastructure, and regulatory policies mediate the relationship between SD and financial stability? and (iii) Are there notable cross-country differences in the effectiveness of SD in stabilizing financial institutions in China and Vietnam?

This study selected China and Vietnam as comparison objects due to the obvious differences in banking systems and economic development levels between the two countries. China is one of the world's largest economies with a tightly regulated financial system that focuses on sustainable development and risk management (Huang, G., Ye, F., Li, Y., Chen, L., & Zhang, M., 2023). Meanwhile, Vietnam, a developing country, is actively improving its financial system to deeply integrate into the international economy (Nguyen, T. D., & Dinh, H. T., 2024). Despite these differences, both countries share a socialist-oriented political background, which may shape regulatory priorities and institutional approaches toward SD (London, 2013). Examining how this shared ideological foundation interacts with financial governance provides an important theoretical contribution to comparative sustainable finance studies.

In the aftermath of the global financial crisis, the need to establish a sustainable banking system has garnered heightened attention. Financial institutions in China and Vietnam have executed many SD initiatives or CSR initiatives to bolster their brand and reinforce stakeholder confidence. Prior research has shown a favorable association between CSR and financial success (Wu, M. W., & Shen, C. H., 2013; Cornett, M. M., Erhemjamts, O., and Tehranian, H., 2016); however, most of these studies have been conducted in developed economies, where financial markets are more mature, and regulatory frameworks are more established. Empirical evidence on how CSR and SD affect financial stability in emerging markets like Vietnam remains scarce, underscoring the importance of this research (Luo, X., Wang, H., Raithel, S., & Zheng, Q., 2015).

To rigorously test these relationships, this study employs secondary data collected from financial statements, annual reports, and public information sources from 2010 to 2022. Financial stability is measured using the Z-score index, which captures the probability of bank insolvency by integrating profitability, leverage, and risk variability (Laeven, L. and Levine, R., 2009). Additionally, the study applies the quantile regression method, which enables a nuanced analysis of how SD influences financial stability across different levels of banking risk (Koenker, R., & Hallock, K. F., 2001). This methodological approach provides a more detailed and robust assessment than traditional mean-based estimation techniques.

The theoretical framework of this study draws upon stakeholder theory and institutional theory. Stakeholder theory posits that firms must balance the interests of multiple stakeholders, including regulators, investors, and society, which aligns with the principles of SD in banking (Freeman, 1984). Institutional theory, on the other hand, emphasizes how regulatory environments and cultural contexts shape corporate behavior, offering a relevant lens to compare China and Vietnam's banking systems

(DiMaggio, P. J., & Powell, W. W., 1983). By integrating these perspectives, this study develops hypotheses that link SD initiatives to financial stability while considering the mediating role of governance and regulatory structures.

This research contributes to the literature by filling three key gaps. First, it provides empirical evidence on the relationship between SD and financial stability in emerging economies, addressing the lack of studies in non-Western contexts. Second, it enhances the theoretical understanding of how political, economic, and institutional factors moderate the effectiveness of SD policies. Third, by employing a quantile regression approach, the study offers a more granular analysis of financial stability dynamics, improving the precision of policy recommendations.

The remainder of this research is structured as follows: Section 2 develops the theoretical framework and presents a comprehensive literature review, further elaborating on the hypotheses. Section 3 outlines the methodology and data sources, while Section 4 presents the empirical findings. Finally, Section 5 discusses implications, limitations, and conclusions.

2. Literature Review

The relationship between SD and financial stability has become a topic of interest to many researchers in recent decades. This section organizes prior studies into key themes to provide a clearer theoretical foundation for this research: (1) the strategic role of SD in financial performance, (2) the impact of SD on financial stability, (3) cross-country comparisons of SD implementation, and (4) methodological advancements in measuring SD's financial impact.

2.1.Sustainable development as a strategic tool for financial performance

SD is often described as a management strategy to enhance financial performance and reduce risks by improving brand image and enhancing trust among stakeholders (Cornett, M. M., Erhemjants, O., and Tehranian, H., 2016). Mangantar (2019) found that strong SD or CSR activities lead to better financial performance, especially through attracting more customers and investors (Mangantar, 2019). Similarly, the resource-based view (RBV) suggests that SD can serve as a competitive advantage for banks by differentiating them in the market (Barney, 1996). This aligns with findings from Hadiwibowo & Purwanti (2024), who argued that SD strengthens a bank's reputation and enhances its market competitiveness (Hadiwibowo, I., & Purwanti, L., 2024).

2.2.Sustainable development and financial stability

SD initiatives are increasingly regarded as critical to financial stability. Giannarakis et al. (2016) emphasized that SD activities signal a bank's commitment to the community, which enhances trust among stakeholders and contributes to long-term stability (Giannarakis, G., Konteos, G., Zafeiriou, E., & Partalidou, X., 2016). Jain et al. (2015) found that banks in the Asia-Pacific region engaging in voluntary SD disclosure not only improve their reputation but also promote financial stability by mitigating risks associated with regulatory non-compliance and public scrutiny (Jain, A., Keneley, M., & Thomson, D., 2015). These findings suggest that SD is not merely an ethical responsibility but a key strategic tool for maintaining resilience in volatile financial environments (Shahid, R., & Zeb, S., 2022).

2.3.Cross-country comparisons in SD implementation: China vs. Vietnam

Research in China indicates that SD is often associated with national objectives, such as the "Belt and Road Initiative," reflecting the strong influence of the government on banks' SD activities (Yang, M., Maresova, P., Akbar, A., Bento, P., & Liu, W., 2021). Wang & Chen (2015) and Li et al. (2019) found that large Chinese banks make significant investments in SD initiatives, which improves

corporate governance and mitigates financial risks, allowing them to remain stable during economic fluctuations. From an institutional theory perspective, this reflects how China's regulatory environment strongly influences SD adoption in the banking sector (DiMaggio, P. J., & Powell, W. W., 1983).

Conversely, in Vietnam, SD remains an emerging notion within the banking industry. Although many banks have implemented SD programs, they have not truly integrated these activities into long-term strategies (Vo, D. H., Van, L. T. H., Dinh, L. T. H., & Ho, C. M., 2020; Thuong, 2024). The legitimacy theory suggests that banks in Vietnam engage in SD initiatives primarily to align with international standards and gain legitimacy in global financial markets (Suchman, 1995). However, weak governance structures and resource constraints hinder the effectiveness of SD programs in contributing to financial stability (Hadiwibowo, I., & Purwanti, L., 2024; Thuong, 2024).

The differences between the two countries may stem from cultural and institutional backgrounds. China's top-down regulatory model ensures that SD initiatives are mandated and systematically enforced, while Vietnam's banking sector is still adapting to global sustainability norms through market-driven mechanisms

(London, 2013). This divergence highlights a critical research gap: how does the institutional framework of each country shape the effectiveness of SD in promoting financial stability?

2.4. Methodological Gaps and the need for advanced analytical techniques

The majority of research on SD and financial stability uses conventional quantitative techniques, including linear regression and panel data analysis (Wu, M. W., & Shen, C. H., 2013). Nonetheless, these approaches fail to capture the heterogeneous impact of SD across banks with varying levels of financial stability. Djalilov & Hartwell (2024) suggest using advanced econometric techniques, such as quantile regression, to better understand how SD affects financial stability under different conditions (Djalilov, K., & Hartwell, C., 2024). This aligns with asymmetric information theory, which posits that financial markets operate under varying degrees of transparency and risk exposure, necessitating tailored analytical approaches (Akerlof, 1970).

Additionally, many studies focus on the direct correlation between SD and financial success but do not explore the moderating role of financial stability in this relationship. Saadaoui & Salah (2023) initiated research into this moderating effect, yet a **comprehensive investigation of how financial stability conditions mediate the SD-stability link in emerging banking sectors, particularly in China and Vietnam, remains absent** (Saadaoui, A. and Salah, O., 2023).

2.5. Research gaps and hypothesis development

Despite extensive research on SD and financial stability, notable gaps remain:

1. Few studies provide direct empirical comparisons of SD's impact on financial stability in China and Vietnam, despite their differing institutional environments.
2. There is limited research on the moderating effect of financial stability on SD initiatives, particularly in emerging markets.
3. The application of advanced econometric methods, such as quantile regression, to analyze SD's impact on financial stability across different financial conditions is still underexplored.

To address these gaps, the following hypotheses are proposed, grounded in stakeholder theory, legitimacy theory, asymmetric information theory, and the resource-based view:

- H1: SD initiatives positively affect the financial stability of banks.

- H2: The impact of SD on financial stability is more pronounced in Chinese banks than in Vietnamese banks due to differences in regulatory structures and institutional frameworks.

By integrating these perspectives, this study provides a more structured and theoretically grounded examination of SD's role in financial stability, addressing key limitations in prior research.

3. Methodology and data

3.1. Methodology

This study applies the research model based on Azmi et al. (2021) and Thuong (2024) to analyze the impact of SD on bank financial stability (Azmi, W., Hassan, M.K., Houston, R. and Karim, M.S., 2021; Thuong, 2024). The regression model is defined as follows:

$$\pi_{i,t} = \alpha + \beta_1 SD_{i,t} + \beta_2 SQSD_{i,t} + \beta_3 X_{i,t} + \varepsilon_i \quad (1)$$

Where:

- $\pi_{i,t}$: is the financial stability index, **measured using the ZSCORE, a widely accepted measure of bank risk** (Laeven, L. and Levine, R., 2009)
- $SD_{i,t}$: is the sustainable development index, proxied by the ESG score, which captures a bank's commitment to environmental, social, and governance responsibilities (Friede, G., Busch, T., & Bassen, A., 2015).
- $SQSD_{i,t}$: is the square of SD to determine the nonlinear relationship between SD and financial stability (Wang, Z., & Sarkis, J., 2017)
- $X_{i,t}$: represents control variables selected based on theoretical justifications (discussed below).
- ε_i : is the random error term.

3.1.1. Financial stability measure

According to Hafeez et al. (2022), the Z-score is an inverse measure of overall bank risk and is widely used in banking literature to assess financial stability (Hafeez, B., Li, X., Kabir, M.H. and Tripe, D., 2022). Z-score is calculated as follows:

$$ZSCORE_{i,t} = \frac{ROA_{i,t} + ETA_{i,t}}{\sigma_{ROA_i}} \quad (2)$$

Where:

- $ROA_{i,t}$: is the ratio of return on assets, capturing bank profitability.
- $ETA_{i,t}$: is the equity-to-assets ratio, representing capital adequacy.
- σ_{ROA_i} : is the standard deviation of ROA in the study period, reflecting earnings volatility and risk exposure.

By incorporating these factors, the Z-score provides a robust measure of financial stability, capturing both profitability and risk-adjusted capital adequacy (Laeven, L. and Levine, R., 2009)

3.1.2. The Method of Moments Quantile Regression (MMQR) approach

This research applies the MMQR approach, as proposed by Machado & Santos Silva (2019), to examine the heterogeneous effects of SD on financial stability across different quantiles of the Z-score distribution (Machado, J.A.F. and Santos Silva, J.M.C., 2019). Unlike standard linear regression models, MMQR offers several advantages:

1. It allows for the estimation of the impact of SD across different levels of financial stability, addressing potential nonlinearities (Khalfaoui, R., Arminen, H., Doğan, B. and Ghosh, S., 2023).
2. It is robust to non-normality and heteroskedasticity in financial data, providing more efficient and consistent estimates (Alvarado, R., Tillaguango, B., Dagar, V., Ahmad, M., Işık, C., Méndez, P. and Toledo, E., 2021).
3. It controls for endogeneity bias, which is a major concern in SD-financial stability research, as SD decisions may be endogenous to financial performance (Wooldridge, 2015).

The general MMQR model is expressed as follows:

$$Q_{ZSCORE}(\tau|X_{i,t}) = (\alpha_i + \gamma_i q(\tau)) + \delta X_{i,t} + \rho Z'_{i,t} q(\tau) \quad (7)$$

Where:

- $Q_{ZSCORE}(\tau|X_{i,t})$: is the τ quantile of $ZSCORE$.
- $X_{i,t}$: are the independent and control variables.
- α_i và γ_i : are the parameters of the model

Unlike traditional OLS, MMQR allows for a more granular analysis of SD's impact on financial stability under different banking conditions.

3.1.3. Addressing methodological concerns

- **Endogeneity and Fixed Effects:** The MMQR approach accounts for potential endogeneity and bank-specific fixed effects, ensuring robust estimations (Machado, J.A.F. and Santos Silva, J.M.C., 2019).
- **Heteroscedasticity Testing:** The Breusch-Pagan/Cook-Weisberg test confirms significant heteroscedasticity (p-value < 0.01), justifying the use of MMQR (Table 1).

Table 1. The results of the Breusch-Pagan test.

ZSCORE	χ^2	p-value
SD	38.12	0.000
E	48.21	0.000
S	24.89	0.000
G	47.79	0.000

Notes: $ZSCORE$, the value of bank Z-score; SD , the bank's sustainable development index, E , a bank's responsibility to its environment index; S , a bank's responsibility to its social index; G , a bank's responsibility to its governance index.

These results indicate that standard regression models would yield biased estimates, further supporting the need for MMQR.

3.2. Control Variables

To ensure the robustness of the regression model, this study includes a set of control variables based on prior empirical research on financial stability. These variables capture key bank-specific and macroeconomic factors that influence financial stability, reducing omitted variable bias (Berger, A. N., & Bouwman, C. H., 2013; Laeven, 2018).

1. Bank Capitalization (LnEq) – Measured as the natural logarithm of total equity, this variable captures a bank's financial strength and ability to absorb losses (Demirgüç-Kunt, A., Detragiache, E., & Tressel, T., 2008). Higher capitalization is generally associated with greater financial stability, as well-capitalized banks can better withstand economic shocks (Admati, A. R., DeMarzo, P. M., Hellwig, M., & Pfleiderer, P., 2013).

2. Credit Risk (LLPR) – Defined as the ratio of loan loss provisions to total loans, this variable measures the bank’s risk exposure due to potential loan defaults (Louzis, D. P., Vouldis, A. T., & Metaxas, V. L., 2012). Higher provisioning may indicate riskier loan portfolios, potentially undermining financial stability.
3. Cost Efficiency (CIR) – Calculated as the ratio of operating expenses to total revenue, this variable reflects operational efficiency in banking (Sufian, F., & Habibullah, M. S., 2010). A higher CIR suggests lower efficiency, which can negatively affect profitability and stability.
4. Economic Growth (GDP) – Measured as the annual GDP growth rate, this macroeconomic variable accounts for overall economic conditions (Beck, T., Demirgüç-Kunt, A., & Levine, R., 2010). Higher GDP growth is associated with improved credit conditions and financial stability.
5. Inflation Rate (INF) – Captures the general price level changes, which can influence bank profitability and stability (Boyd, J. H., Levine, R., & Smith, B. D., 2001). High inflation can erode real returns and increase default risk, thereby impacting financial stability.
6. COVID-19 Shock (Covid) – A binary variable that takes the value 1 for the years 2020-2022 and 0 otherwise, this variable controls for the systemic impact of the COVID-19 pandemic on banking stability (Goodell, 2020). The pandemic caused significant disruptions in credit markets, affecting bank profitability and financial stability.

By including these variables, the study ensures that the estimated impact of SD on financial stability is not confounded by other critical financial and macroeconomic influences (Laeven, L., & Valencia, F., 2020).

3.3.Data and sample selection

The study utilizes secondary data from 2010 to 2022, covering a period that encompasses both the global financial crisis recovery and the post-COVID-19 banking environment. Data sources include:

- Financial statements and annual reports (Refinitiv).
- Regulatory filings from the State Bank of Vietnam and the People’s Bank of China.
- Publicly available sustainability reports from Chinese and Vietnamese banks.

Sample Selection Process:

1. Ensured consistency by selecting banks that reported ESG scores across the entire study period.
2. Filtered banks based on asset size to exclude outliers that could distort the financial stability measures.
3. Cleaned the dataset for missing values to ensure robustness.

4. The results and discussion

4.1.Descriptive statistics

Table 2: Descriptive statistics of variables used

Variables	China					Vietnam				
	Obs.	Mean	Std.Dev.	Min	Max	Obs.	Mean	Std.Dev.	Min	Max
Zscore	296	3.843	2.595	3.833	12.306	390	20.268	12.909	2.603	82.725
SD	296	45.283	14.318	6.724	86.574	390	66.430	17.621	20.88	95.25
E	296	60.681	16.371	15.247	96.564	390	55.815	34.600	0	100
S	296	42.238	14.814	5.334	86.379	390	64.438	23.150	12.713	100
G	296	51.312	20.804	5.299	97.002	390	75.466	12.428	29.263	100
LnEq	296	24.306	6.354	22.988	28.775	390	16.180	1.020	14.314	18.725
LLPR	296	1.156	0.593	0.241	3.212	390	1.347	0.564	0.490	4.080
CIR	296	53.31	1.708	25.552	91.415	390	83.842	13.067	36.070	142.683
GDP	296	2.542	2.443	1.047	9.570	390	6.101	1.584	2.561	8.020
INF	296	2.770	2.025	-0.002	8.075	390	5.324	4.599	0.631	18.677
Covid	296	0.277	0.448	0	1	390	0.148	0.356	0	1

Notes: *ZSCORE*, the value of bank Z-score; *SD*, the bank's sustainable development index, *E*, a bank's responsibility to its environment index; *S*, a bank's responsibility to its social index; *G*, a bank's responsibility to its governance index; *LnEq*, the natural logarithm of equity; *LLPR*, the ratio of loan loss provision to total loans; *CIR*, the ratio of operating expenses to total revenue; *GDP*, the annual economic growth rate; *INF*, inflation rate; *Covid*, a dummy variable that takes a value of 1 for the years 2020-2022, and 0 otherwise;

The descriptive statistics in Table 2 indicate considerable disparities in key characteristics related to stability, size, social - environmental – governance responsibility, and performance across banks in the two nations.

The mean Z-score of banks in Vietnam is 20.268, far surpassing that of China at 3.843, indicating that Vietnamese banks are generally more financially stable. Nonetheless, the standard deviation in Vietnam (12.909) is significantly larger than that in China (2.595), indicating a large dispersion in stability across banks. Certain banks in Vietnam exhibit considerable stability, while others face greater risks. In contrast, the stability of Chinese banks is relatively uniform but concentrated at lower levels. The average SD score in Vietnam (66.430) is higher than that in China (45.283), indicating a greater commitment by Vietnamese banks to sustainable development activities. The specific components of SD also show similar results. The environmental index (*E*) in China averaged 60.681, slightly higher than that in Vietnam (55.815), reflecting significant attention to environmental issues in both countries. The social index (*S*) in Vietnam (64.438) is significantly higher than that in China (42.238), indicating that banks in Vietnam focus more on social responsibilities, such as community development and social security. The governance index (*G*) in Vietnam reached 75.466, significantly higher than China (51.312), reflecting improvements in corporate governance at Vietnamese banks, which may be a result of stricter regulations on internal management and shareholder relations. These results show that Vietnamese banks have a more balanced priority on all three SD aspects, especially in the governance area, which plays an important role in increasing stakeholder trust.

In terms of bank size (*LnEq*—natural logarithm of equity): The equity size of Chinese banks (24.306) is significantly larger than that of Vietnamese banks (16.180), indicating a clear difference in asset base and level of banking system development between the two countries. The differences in economic size, the timing of financial system development, and the concentration of large banks in China can explain this. However, in terms of credit risk provision ratio (*LLPR*), Vietnamese banks have a higher risk provision ratio (1.347) than Chinese banks (1.156), indicating more caution in managing bad debts and credit risks. This partly reflects the impact of tightening capital safety regulations in Vietnam to deal with liquidity risks and the possibility of capital loss.

Macroeconomic factors (*GDP* and inflation): the economic growth rate (*GDP*) in Vietnam (6,101%) are much higher than those of China (2,542%), indicating a more dynamic economic environment. This finding may reflect the strong development in the manufacturing, service, and investment sectors in Vietnam in recent years. Nevertheless, the inflation rate in Vietnam (5,324%) is also significantly higher than that of China (2,770%). This is a problem in sustaining economic stability and regulating pricing in Vietnam.

The research reveals substantial disparities in financial stability, environmental and social governance, capital size, and operational efficiency between banks in Vietnam and China. Vietnamese banks have high Z-scores and ESG ratings, indicating a robust dedication to sustainability and stability. Nevertheless, its elevated cost-to-income ratio (*CIR*) indicates potential for improvement in operational efficiency. Conversely, Chinese banks, despite their substantial capital, have difficulties with diminished ESG ratings.

These findings highlight the important role of corporate social responsibility in promoting banking stability and efficiency in developing countries. Bank managers may consider strengthening the implementation of CSR policies to improve competitiveness and build trust among stakeholders.

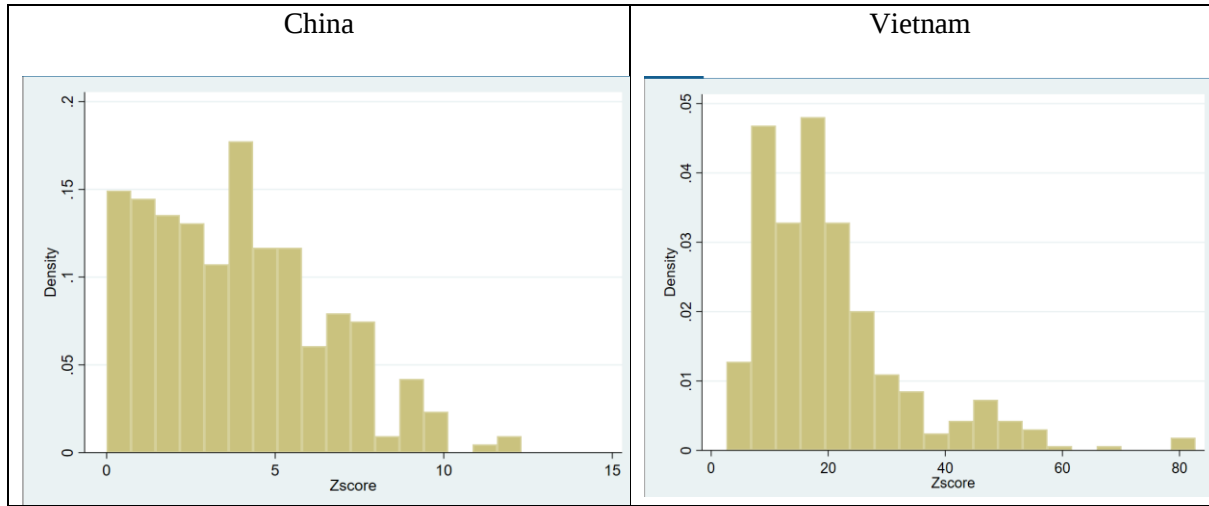


Fig.1: Histogram for Zscore

The research also examined the distribution of the Z-score, revealing that it was significantly skewed and had heavy tails, as seen in Figure 1. The author then conducted the Shapiro-Wilk (1965) W test to assess the normality of this variable (Shapiro, S.S. and Wilk, M.B., 1965). At the 1% significance level, the findings indicated that the null hypothesis of a normal distribution of the Z score was not upheld. This intensified the need for the MMQR strategy.

Figure 1 illustrates that the Z-score distribution in China is left-skewed and has a tighter range, signifying poor financial stability and less diversity across institutions. Conversely, the distribution in Vietnam has a broader range and elevated mean, although demonstrates significant variability in stability between institutions. The findings corroborate the prior descriptive statistical study, indicating that Vietnamese banks exhibit greater but uneven levels of financial stability, whilst Chinese banks have lower but more uniform levels of stability. This serves as a crucial foundation for further research on the determinants of financial stability in these two nations.

4.2. Correlation matrix

Table 3: Correlation matrix among variables

No.	Variables	1	2	3	4	5	6	7
China								
1	Zscore	1						
2	SD	-0.027	1					
3	LnEq	0.397***	0.023	1				
4	LLPR	0.142**	-0.150***	0.416***	1			
5	CIR	0.139**	-0.006	0.753***	0.678***	1		
6	GDP	-0.240***	-0.092	-0.361***	-0.504***	-0.522***	1	
7	INF	-0.250***	-0.050	-0.186***	-0.210***	-0.282***	0.378***	1
Vietnam								
1	Zscore	1						
2	SD	0.119**	1					
3	LnEq	-0.051	0.579***	1				
4	LLPR	0.022	0.202***	0.328***	1			
5	CIR	0.035	-0.077	-0.303***	0.050	1		
6	GDP	-0.020	-0.054	-0.079	-0.093*	0.029	1	

7	INF	0.192***	-0.307***	-0.256***	0.132***	0.108**	0.042	1
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During the evaluation of the regression models, the author examined the correlation among independent variables to identify multicollinearity. Table 3 indicates a lack of strong association among the variables in the model, as seen by the low correlation coefficient value. Addressing the multicollinearity issue enables the author to validate the precision and dependability of the regression outcomes. The MMQR method makes it easier to look at all of the data, which gives us more real-world information about why banks in the two countries are not as financially stable as each other. The study area of sustainable development and financial stability has grown a lot because of these results. They show that emerging nations need better banking management strategies.

4.3. The results of our baseline model

Table 4: The result of our baseline model

MMQR	Location	Scale	Q5	Q10	Q20	Q25	Q50	Q75	Q80	Q90	Q95
China											
SD	-0.086**	0.013	-0.111*	-0.108*	-0.100**	-0.098**	-0.087**	-0.075*	-0.073	-0.065	-0.059
	[-2.13]	[0.53]	[-1.73]	[-1.83]	[-2.02]	[-2.06]	[-2.14]	[-1.68]	[-1.57]	[-1.18]	[-0.93]
SQSD	0.000	-0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	[0.49]	[-0.34]	[0.56]	[0.57]	[0.58]	[0.58]	[0.50]	[0.28]	[0.24]	[0.11]	[0.03]
LnEq	0.222***	-0.012	0.247***	0.243***	0.236***	0.234***	0.223***	0.211***	0.209***	0.201***	0.195***
	[4.88]	[-0.46]	[3.42]	[3.68]	[4.23]	[4.37]	[4.88]	[4.22]	[4.02]	[3.27]	[2.75]
LLPR	2.060***	-0.317	2.658***	2.567***	2.386***	2.341***	2.068***	1.778***	1.729***	1.542***	1.392***
	[5.89]	[-1.49]	[4.81]	[5.07]	[5.58]	[5.70]	[5.88]	[4.64]	[4.34]	[3.25]	[2.54]
CIR	-0.756***	0.077	-0.902***	-0.880***	-0.836***	-0.825***	-0.758***	-0.687***	-0.675***	-0.629***	-0.593**
	[-4.29]	[0.72]	[-3.24]	[-3.45]	[-3.88]	[-3.99]	[-4.30]	[-3.55]	[-3.36]	[-2.64]	[-2.15]
GDP	0.181***	-0.039	0.256**	0.244**	0.222***	0.216***	0.182***	0.146**	0.140*	0.117	0.098
	[2.74]	[-0.98]	[2.45]	[2.55]	[2.75]	[2.79]	[2.75]	[2.02]	[1.86]	[1.30]	[0.95]
INF	-0.131**	-0.013	-0.105	-0.109	-0.117*	-0.119**	-0.131**	-0.144**	-0.146**	-0.154**	-0.160*
	[-2.37]	[-0.41]	[-1.20]	[-1.36]	[-1.73]	[-1.83]	[-2.36]	[-2.36]	[-2.31]	[-2.06]	[-1.86]
Const	3.353***	1.145	1.195	1.526	2.175	2.339*	3.323***	4.369***	4.544***	5.219***	5.758***
	[2.77]	[1.55]	[0.62]	[0.87]	[1.47]	[1.64]	[2.73]	[3.29]	[3.29]	[3.17]	[3.03]
Vietnam											
SD	-0.513**	-0.192	-0.154	-0.228	-0.310	-0.344	-0.516**	-0.677**	-0.732**	-0.856**	-1.003**
	[-2.07]	[-1.24]	[-0.43]	[-0.72]	[-1.11]	[-1.29]	[-2.08]	[-2.30]	[-2.28]	[-2.16]	[-2.03]
SQSD	0.003*	0.001	0.000	0.001	0.001	0.002	0.003*	0.004**	0.004**	0.005**	0.006*
	[1.79]	[1.21]	[0.25]	[0.87]	[0.87]	[1.04]	[1.79]	[2.04]	[2.04]	[1.97]	[1.87]
LnEq	1.692**	0.072	1.557	1.584*	1.615*	1.628**	1.693**	1.754**	1.774*	1.821	1.876
	[2.29]	[0.16]	[1.46]	[1.67]	[1.94]	[2.04]	[2.29]	[1.99]	[1.85]	[1.55]	[1.27]
LLPR	0.427	-0.191	0.784	0.711	0.629	0.595	0.424	0.263	-0.209	0.084	-0.060
	[0.59]	[-0.42]	[0.74]	[0.76]	[0.76]	[0.75]	[0.58]	[0.30]	[0.22]	[0.07]	[-0.04]
CIR	-0.158***	0.009	-0.176***	-0.172***	-0.168***	-0.166***	-0.158***	-0.150***	-0.148***	-0.142***	-0.135**
	[-5.99]	[0.56]	[-4.59]	[-5.08]	[-5.63]	[-5.83]	[-5.97]	[-4.77]	[-4.30]	[-3.36]	[-2.56]
GDP	-0.123	-0.056	-0.017	-0.038	-0.063	-0.073	-0.124	-0.171	-0.187	-0.224	-0.267
	[-0.64]	[-0.47]	[-0.06]	[-0.16]	[-0.29]	[-0.35]	[-0.65]	[-0.75]	[-0.76]	[-0.74]	[-0.70]
INF	0.567***	0.198***	0.197	0.273*	0.358***	0.393***	0.570***	0.737***	0.794***	0.922***	1.074***
	[4.92]	[2.74]	[1.15]	[1.85]	[2.77]	[3.18]	[4.89]	[5.37]	[5.29]	[4.94]	[4.65]
Const	22.140	7.578	8.019	10.917	14.160	15.505	22.265	28.630	30.772	35.686	41.448
	[1.46]	[0.79]	[0.36]	[0.56]	[0.83]	[0.95]	[1.46]	[1.58]	[1.56]	[1.47]	[1.37]

Notes: *ZSCORE*, the value of bank Z-score; *SD*, the bank's sustainable development index; *E*, a bank's responsibility to its environment index; *S*, a bank's responsibility to its social index; *G*, a bank's responsibility to its governance index; *LnEq*, the natural logarithm of equity; *LLPR*, the ratio of loan loss provision to total loans; *CIR*, the ratio of operating expenses to total revenue; *Lnloan*, the natural logarithm of total loan; *LnDep*, the natural logarithm of total deposits; *GDP*, the annual economic growth rate; *INF*, inflation rate; *Covid*, a dummy variable that takes a value of 1 for the years 2020-2022, and 0 otherwise; *, **, *** denote the significance levels at 10, 5, and 1 per cent, respectively. Robust standard errors are inside the brackets.

Sustainable development (SD), bank size (LnEq), credit risk provision ratio (LLPR), and macroeconomic conditions (GDP and inflation) influence the financial stability (Z-score) of banks in China and Vietnam. Table 4 displays the consequences. We interpret this study through the lenses of Stakeholder Theory (Freeman, 1984), Resource-Based View (RBV) (Barney, 1996), and Information Asymmetry Theory (Akerlof, 1970). The study's results are contrasted with those from previous research studies to better understand the impact of SD on the stability of banks in both developed and emerging nations.

In China, the SB variable's coefficient is negative and statistically significant ($p < 0.05$) across quantiles from Q5 to Q50, suggesting that SB activities have a negative impact on the financial stability of banks there. There is no statistical significance for the SQSD variable across any of the quantiles. This means that the level of CSR implementation is not very good. The Information Asymmetry Theory (Akerlof, 1970) suggests that this outcome may indicate that Chinese banks are either not fully transparent about SB or are not using it optimally. Stakeholders may question the efficacy of CSR initiatives if information is ambiguous or concealed, resulting in diminished trust in the financial soundness of institutions. Meckling & Jensen (1976) endorses this perspective, contending that poorly managed SB activities may impose a fiscal burden and diminish financial performance (Meckling, W. H., & Jensen, M. C., 1976).

Consequently, in Vietnam, the coefficient of the SD variable is negative at elevated quantiles (Q50 to Q95) and statistically significant ($p < 0.05$). This indicates that SD efforts undermine the stability of larger and more established institutions. Conversely, the SQSD variable attains a positive and meaningful value at elevated quantiles. This indicates that SB and financial stability may exhibit a non-linear U-shaped correlation. The findings indicate that the first phase of SD adoption may incur more costs than benefits; nevertheless, with prolonged and successful implementation, SD will contribute to financial stability. Zhou et al. (2021) in China and Yuen et al. (2022) in the United States share this perspective (Zhou, G., Sun, Y., Luo, S., & Liao, J., 2021; Yuen, M. K., Ngo, T., Le, T. D. Q., & Ho, T. H., 2022). This also supports the trade-off hypothesis in SD management (Galant, A., and Cadez, S., 2017), which says that banks have to spend money at first to reach their sustainability goals, but if they do these things right, they will benefit in the long run.

Bank size (LnEq): The LnEq variable has a positive and statistically significant coefficient ($p < 0.01$) in the majority of quantiles for both countries. This suggests that having more equity capital makes the financial system more stable. This indicates that an increase in equity capital enhances the stability of the financial system. This finding fits with Resource-Based Theory (RBV) (Barney, 1996), which argues that large capital is a sustainable competitive resource, helping banks reduce risk and increase their resilience to economic fluctuations. A larger size facilitates superior capital mobilization and improved liquidity; hence, it increases the stability of banks.

Economic growth (GDP): In China, GDP has a positive and statistically significant effect across quantiles ($p < 0.05$), suggesting that a favorable economic environment helps banks improve their financial stability. In Vietnam, GDP also has a positive effect, especially at lower quantiles, suggesting that economic growth helps weak banks improve their stability. This finding is in line with what Demirgüç-Kunt et al. (2008) found, which is that macroeconomic factors play a big part in lowering banks' credit and liquidity risks (Demirgüç-Kunt, A., Detragiache, E., & Tressel, T., 2008).

Inflation (INF): In China, inflation has a negative and statistically significant coefficient at different quantiles, indicating its detrimental effect on bank stability. In Vietnam, INF also has a negative impact at high quantiles, suggesting that large and stable banks are vulnerable to price volatility risks. High inflation can reduce the real value of bank assets and increase the risk of bad debts. These findings emphasize the importance of macroeconomic policy in controlling inflation in order to maintain financial stability.

Table 5: The results of using SD components.

MMQR	Location	Scale	Q5	Q10	Q20	Q25	Q50	Q75	Q80	Q90	Q95
China											
E	0.060 [1.54]	0.027 [1.06]	0.003 [0.04]	0.011 [0.17]	0.029 [0.53]	0.034 [0.64]	0.062 [1.62]	0.084** [2.27]	0.089** [2.32]	0.100** [2.32]	0.117** [2.19]
SQE	-0.001*** [-2.91]	-0.000 [-1.12]	-0.000 [-0.68]	-0.000 [-0.88]	-0.000 [-1.44]	-0.000 [-1.61]	-0.001*** [-3.02]	-0.001*** [-3.74]	-0.001*** [-3.76]	-0.001*** [-3.61]	-0.001*** [-3.26]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Const	1.058 [0.88]	0.928 [1.15]	-0.848 [-0.36]	-0.558 [-0.26]	0.040 [0.02]	0.190 [0.12]	1.130 [0.95]	1.863 [1.63]	2.011* [1.70]	2.375* [1.79]	2.935* [1.79]

MMQR	Location	Scale	Q5	Q10	Q20	Q25	Q50	Q75	Q80	Q90	Q95
Vietnam	Location	Scale	Q5	Q10	Q20	Q25	Q50	Q75	Q80	Q90	Q95
E	-0.141**	-0.037	-0.067	-0.086	-0.101	-0.109	-0.141**	-0.174**	-0.181**	-0.207**	-0.231*
	[-2.14]	[-0.95]	[-0.72]	[-1.08]	[-1.40]	[-1.58]	[-2.13]	[-2.19]	[-2.15]	[-1.99]	[-1.86]
SQE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001*	0.001*	0.001	0.001
	[1.53]	[0.90]	[0.33]	[0.62]	[0.87]	[1.03]	[1.52]	[1.66]	[1.65]	[1.57]	[1.49]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Const	9.069	2.307	4.439	5.637	6.549	7.055	9.053	11.095	11.579	13.161	14.672
	[0.75]	[0.33]	[0.26]	[0.39]	[0.50]	[0.56]	[0.75]	[0.77]	[0.75]	[0.70]	[0.65]
China	Location	Scale	Q5	Q10	Q20	Q25	Q50	Q75	Q80	Q90	Q95
S	-0.069**	0.035*	-0.139***	-0.125***	-0.106***	-0.103***	-0.070**	-0.036	-0.032	-0.014	0.001
	[-2.08]	[1.85]	[-2.86]	[-2.89]	[-2.82]	[-2.79]	[-2.09]	[-0.93]	[-0.79]	[-0.30]	[0.03]
SQS	0.000	-0.000	0.000	0.000	0.000	0.000	0.000	-0.000	-0.000	-0.000	-0.000
	[0.13]	[-1.55]	[1.29]	[1.18]	[0.93]	[0.87]	[0.14]	[-0.60]	[-0.68]	[-0.90]	[-1.04]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Const	2.445**	0.635	1.203	1.461	1.798	1.856	2.438**	3.039**	3.119**	3.436**	3.715**
	[2.27]	[1.02]	[0.77]	[1.05]	[1.49]	[1.57]	[2.26]	[2.40]	[2.39]	[2.28]	[2.17]
Vietnam	Location	Scale	Q5	Q10	Q20	Q25	Q50	Q75	Q80	Q90	Q95
S	-0.218	0.144	-0.479	-0.430	-0.364	-0.348	-0.229	-0.084	-0.055	0.029	0.128
	[-0.68]	[0.52]	[-0.63]	[-0.64]	[-0.66]	[-0.66]	[-0.69]	[-0.38]	[-0.23]	[0.09]	[0.26]
SQS	0.001	-0.001	0.003	0.002	0.002	0.002	0.001	0.000	0.000	-0.000	-0.001
	[0.53]	[-0.48]	[0.54]	[0.54]	[0.55]	[0.55]	[0.54]	[0.21]	[0.08]	[-0.17]	[-0.30]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Const	17.163	-1.620	20.095	19.545	18.797	18.619	17.279	15.648	15.321	14.365	13.263
	[0.63]	[-0.07]	[0.31]	[0.34]	[0.39]	[0.41]	[0.60]	[0.81]	[0.75]	[0.50]	[0.31]
China	Location	Scale	Q5	Q10	Q20	Q25	Q50	Q75	Q80	Q90	Q95
G	-0.083**	-0.017	-0.047	-0.054	-0.064	-0.068	-0.084**	-0.100***	-0.102***	-0.108***	-0.115***
	[-2.37]	[-0.75]	[-0.68]	[-0.90]	[-1.28]	[-1.45]	[-2.47]	[-3.00]	[-2.99]	[-2.87]	[-2.66]
SQG	0.000**	0.000	0.000	0.000	0.000	0.000	0.000**	0.000***	0.000***	0.000***	0.001**
	[2.14]	[0.68]	[0.61]	[0.81]	[1.15]	[1.31]	[2.23]	[2.71]	[2.70]	[2.60]	[2.41]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Const	2.266**	2.038***	-2.014	-1.101	0.048	0.463	2.457**	4.343***	4.545***	5.244***	6.078***
	[2.00]	[2.77]	[-0.91]	[-0.57]	[0.03]	[0.31]	[2.19]	[4.02]	[4.14]	[4.29]	[4.25]
Vietnam	Location	Scale	Q5	Q10	Q20	Q25	Q50	Q75	Q80	Q90	Q95
G	0.126	0.327	-0.474	-0.343	-0.216	-0.169	0.128	0.416	0.477	0.699	0.917
	[0.03]	[0.07]	[-0.04]	[-0.03]	[-0.02]	[-0.02]	[0.03]	[0.57]	[0.73]	[0.20]	[0.14]
SQG	-0.000	-0.002	0.003	0.002	0.001	0.001	-0.000	-0.002	-0.003	-0.004	-0.005
	[-0.02]	[-0.06]	[0.03]	[0.03]	[0.02]	[0.02]	[-0.02]	[-0.49]	[-0.63]	[-0.17]	[-0.12]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Const	10.215	-7.230	23.514	20.614	17.815	16.762	10.176	3.814	2.462	-2.448	-7.270
	[0.04]	[-0.03]	[0.03]	[0.03]	[0.03]	[0.03]	[0.04]	[0.09]	[0.06]	[-0.01]	[-0.02]

Notes: *ZSCORE*, the value of bank Z-score; *SD*, the bank's sustainable development index; *E*, a bank's responsibility to its environment index; *S*, a bank's responsibility to its social index; *G*, a bank's responsibility to its governance index; *LnEq*, the natural logarithm of equity; *LLPR*, the ratio of loan loss provision to total loans; *CIR*, the ratio of operating expenses to total revenue; *Lnloan*, the natural logarithm of total loan; *LnDep*, the natural logarithm of total deposits; *GDP*, the annual economic growth rate; *INF*, inflation rate; *Covid*, a dummy variable that takes a value of 1 for the years 2020-2022, and 0 otherwise; *, **, *** denote the significance levels at 10, 5, and 1 per cent, respectively. Robust standard errors are inside the brackets.

Table 5 displays the results of percentile regression for environmental responsibility (E), social responsibility (S), and governance responsibility (G) in sustainable development (SB) related to the financial stability (Z-score) of commercial banks in China and Vietnam.

Environmental Responsibility (E)

In China, the coefficient of E is not statistically significant at low quantiles (Q5-Q50). At the higher levels (Q75 to Q95), these findings show a positive and significant effect ($p < 0.05$), meaning that being environmentally responsible helps large, stable banks be more stable. This result suggests that large banks in China are able to take advantage of environmental activities, such as green credit financing and green product and service development, to enhance stakeholder trust and improve competitive position. This is consistent with Freeman's Stakeholder Theory (Freeman, 1984), according to which organizations achieve long-term stability when they balance the interests of stakeholders. Zhou et al. (2021) study also confirmed that properly implemented sustainability programs can improve brand image and reduce financial risks (Zhou, G., Sun, Y., Luo, S., & Liao, J., 2021; Thuong, 2024). The SQE

variable is negative and statistically significant ($p < 0.01$) at all levels. This means that doing a lot of environmental activities does not help and may even harm financial stability. This result may reflect that the costs of implementing extensive environmental activities are too large compared to the benefits achieved, leading to a decrease in bank performance. This view is consistent with the Trade-Off Cost Theory, which suggests that organizations face increased costs when investing in sustainability goals. According to Meckling & Jensen (1976), organizations need to optimally manage resources when investing in CSR to avoid a decline in financial performance (Meckling, W. H., & Jensen, M. C., 1976). This is contrary to some studies that support the view that CSR brings long-term advantages to banks (Carroll, A. B., & Shabana, K. M., 2010). The above evidence shows that the results of the environmental pillar are inverted U-shaped.

Conversely, the findings in China indicate that the correlation between environmental pillars and the financial stability of commercial banks in Vietnam is U-shaped. The E variable has a negative and statistically significant effect ($p < 0.05$) in most cases from Q5 to Q95. This suggests that being environmentally responsible might have a negative impact on the financial stability of Vietnamese banks. The findings indicate that banks in Vietnam are struggling to incorporate environmental aims into their commercial operations. In the absence of a specific sustainability management plan, achieving equilibrium between the costs and benefits of environmental initiatives may be challenging. This matches the findings of Thuong (2024) and Huang et al. (2023), which suggest that starting ESG projects can initially raise credit risk and operating costs (Thuong, 2024; Huang, G., Ye, F., Li, Y., Chen, L., & Zhang, M., 2023). The coefficient of the SQE variable is not statistically significant in the majority of locations, with the exception of some upper medium ranges (Q75 and Q80). Increased environmental responsibility does not substantially impact the financial soundness of banks in Vietnam. This may indicate the inconsistency in the execution of sustainability initiatives in Vietnam. Banks may lack enough resources or expertise to successfully execute comprehensive environmental initiatives. Furthermore, the understanding of environmental responsibility's significance in risk management may be inadequate, resulting in banks failing to realize the anticipated advantages from these initiatives.

In conclusion, major banks in China need to persist in their investment in sustainable development initiatives and policies, particularly those pertaining to environmental stewardship. Nevertheless, authorities must exercise prudence in the expansion of these initiatives to prevent exorbitant expenses. Vietnamese banks must enhance their sustainability management strategies by improving managerial capability and increasing awareness of environmental responsibility. Financial institutions must establish enduring strategies to incorporate sustainability objectives into their operational frameworks.

Social Responsibility (S)

In China, the S variable has a negative coefficient and is statistically significant ($p < 0.05$) over several quantiles from Q5 to Q50. At higher levels (from Q75 to Q95), the effect of social responsibility is no longer significant, indicating that its negative impact is decreasing. The adverse effect at the lower and intermediate quantiles indicates that banks have not yet adequately leveraged social responsibility. Elevated expenses or insufficient transparency in CSR management may contribute to this issue. According to the Asymmetric Information Theory, stakeholders may undervalue CSR initiatives due to inadequate communication or ineffectiveness. This perspective aligns with Meckling & Jensen (1976) research, indicating that poorly managed CSR spending may adversely affect short-term financial success. Moreover, the SQS variable lacks statistical significance across all quantiles. This result indicates a negative linear correlation between CSR and financial stability. This may be due to banks' insufficient emphasis on CSR initiatives or the inadequacy of these programs to effect substantial change.

In Vietnam, the variable S lacks statistical significance across the majority of quantiles, suggesting that social responsibility does not significantly influence financial stability in Vietnamese banks. This outcome indicates that social responsibility initiatives in Vietnam may be ineffectively executed, or the expenses associated with these efforts surpass their advantages. This contradicts research indicating that

CSR yields long-term advantages for banks (Carroll, A. B., & Shabana, K. M., 2010). This finding matches the research done by Thuong (2024) and Huang et al. (2023), showing that starting CSR activities can increase credit risk and operational costs (Thuong, 2024; Huang, G., Ye, F., Li, Y., Chen, L., & Zhang, M., 2023). Additionally, the SQS variable does not show any important impact at any level, indicating that strong CSR activities do not significantly affect bank stability. The absence of focus or a comprehensive plan for expanding CSR in banks may explain this phenomenon. Insufficient awareness or policy endorsement may diminish the efficacy of these initiatives.

In conclusion, Chinese banks must enhance their CSR implementation methods, particularly those with moderate and low stability levels. The transparency of information and CSR reporting is crucial for augmenting stakeholder confidence. Vietnamese banks must enhance and execute more efficacious CSR initiatives, concentrating on certain domains such as community development and environmental stewardship. Enhancing knowledge and the ability to manage CSR would enable banks to attain long-term advantages.

Governance Responsibility (G)

In China, the G variable has a detrimental impact on the financial stability of banks, particularly at elevated values (Q75 to Q95). This indicates that an increase in governance responsibility adversely impacts bank stability, with this conclusion being statistically significant ($p < 0.05$) at all levels. This finding suggests that Chinese banks are facing challenges with governance, as strict governance rules are expensive to follow. This affects their ability to stay financially stable in the short term. This aligns with the Trade-Off Theory, which posits that banks must exchange elevated governance costs for long-term advantages. Also, according to the Information Asymmetry Theory (Akerlof, 1970), if there are no clear and effective governance rules, stakeholders may struggle to accurately judge the value of these initiatives (Akerlof, 1970). This can threaten the bank's stability. This perspective aligns with Meckling & Jensen (1976) research about the detrimental effects of inefficient governance expenses (Meckling, W. H., & Jensen, M. C., 1976). Evidence indicates that governance accountability has a U-shaped relationship with financial stability. The SQG variable has a significant favorable impact ($p < 0.05$) at elevated values (Q75 to Q95). Robust governance accountability contributes to the stabilization of bigger and more dependable institutions. This indicates that once banks attain a certain degree of growth, comprehensive governance measures enhance financial stability. This result supports the Resource-Based Theory (Barney, 1996), which suggests that good governance gives banks a competitive edge by making them more stable and better at handling risks.

In Vietnam, the variable G is not statistically significant across all quantiles, suggesting that governance duties have not substantially influenced financial stability in Vietnamese institutions. This may be due to Vietnamese banks lacking effective governance or failing to apply governance norms suitable for their size and operational features. Moreover, the capacity to comprehend and enforce governance norms may be inconsistent, resulting in an incapacity to have a distinct effect. The variable SQG does not show any statistical significance at any level, which means that good governance practices do not affect the financial stability of Vietnamese banks. This finding shows that Vietnam needs to improve its governance policies in terms of how well they are carried out and how effective they are. Banks should focus on creating clearer and better governance practices.

In essence, Chinese banks must enhance their governance performance to reduce superfluous expenses and optimize the advantages derived from comprehensive governance initiatives. Vietnamese banks must augment their governance capabilities via training initiatives and technological support to boost risk management and operational efficiency.

4.4. Robustness checks

We follow Köhler (2015) to decompose ZSCORE into risk-adjusted returns on asset (RAR_{ROA}) (Köhler, 2015). As in Stiroh (2004), $RAR_{ROA_{i,t}} = \frac{ROA_{i,t}}{\sigma_{ROA_i}}$, where ROA is the returns on assets, respectively; σ_{ROA} is standard deviation of returns on assets over the examined period (Stiroh, 2004; Laeven, L. and Levine, R., 2009). Table 6 indicates that most of above findings still hold in the case of RAR_{ROA} .

Table 6: The result of MMQR

MMQR	Location	Scale	Q5	Q10	Q20	Q25	Q50	Q75	Q80	Q90	Q95
China											
SD	-0.017 [-0.29]	-0.004 [-0.09]	-0.008 [-0.08]	-0.010 [-0.12]	-0.013 [-0.17]	-0.013 [-0.19]	-0.016 [-0.28]	-0.021 [-0.28]	-0.022 [-0.27]	-0.026 [-0.22]	-0.031 [-0.19]
SQSD	-0.000 [-0.23]	-0.000 [-0.37]	0 .000 [0.20]	0 .000 [0.15]	0 .000 [0.06]	0 .000 [0.02]	-0.000 [-0.18]	-0.000 [-0.40]	-0.000 [-0.41]	-0.000 [-0.43]	-0.000 [-0.42]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Const	3.071 [1.59]	1.770 [1.07]	-0.358 [-0.10]	0 .458 [0.16]	1.339 [0.56]	1.614 [0.72]	2.772 [1.45]	4.644* [1.87]	5.056* [1.85]	6.644* [1.69]	8.478 [1.55]
Vietnam											
SD	-0.393** [-2.15]	-0.175 [-1.55]	-0.069 [-0.25]	-0.135 [-0.56]	-0.202 [-0.93]	-0.228 [-1.09]	-0.387** [-2.11]	-0.543*** [-2.60]	-0.594*** [-2.62]	-0.706** [-2.55]	-0.813** [-2.45]
SQSD	0.002** [1.97]	0 .001 [1.61]	0.000 [0.09]	0.000 [0.38]	0.001 [0.75]	0.001 [0.90]	0.002* [1.93]	0.003** [2.47]	0.004** [2.51]	0.004** [2.47]	0.005** [2.41]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Const	15.205 [1.44]	8.298 [1.27]	-0.155 [-0.01]	2.991 [0.21]	6.145 [0.49]	7.376 [0.61]	14.933 [1.41]	22.340* [1.85]	24.738* [1.89]	30.039* [1.88]	35.121* [1.84]

Research has found similar evidence, which suggests the robustness of the model.

5. Conclusion

This study makes important contributions to understanding the complex relationships between sustainable development and financial stability in the context of emerging markets. The findings highlight that the impact of ESG practices on bank stability is not homogeneous but varies across different dimensions, bank sizes, and institutional environments. In particular, the non-linear U-shaped and inverted U-shaped patterns revealed by the MMQR analysis shed new light on the contingent nature of sustainability-stability relationships. The study offers valuable policy insights for banks and regulators in China and Vietnam to optimize their sustainability strategies. It suggests that banks need to carefully balance ESG investments with financial performance, provide transparent sustainability disclosures, leverage green finance opportunities, and enhance their sustainability management capabilities. Regulators should provide a conducive macro-economic environment and targeted support for ESG initiatives. Theoretically, the study extends the application of stakeholder theory, resource-based view, and trade-off hypothesis to the context of sustainable finance in emerging markets. It demonstrates that the predictions of these theories need to be modified to account for the institutional differences between developed and emerging economies. While the study's findings may not be readily generalizable beyond China and Vietnam, they provide a useful starting point for future research on sustainable banking in other emerging markets. More research is needed to identify the key contingency factors that shape the sustainability-stability nexus and to develop robust sustainability management frameworks tailored to the realities of emerging market banks.

The author proposes the following policy implications for banks in China and Vietnam derived from the previously discussed findings:

For banks in China, they should prioritize the efficient management of expenditures associated with environmental, social, and governance initiatives to mitigate adverse effects on financial performance. Moreover, banks need to augment the transparency of sustainability reporting to bolster stakeholder confidence and mitigate the danger of information asymmetry. Ultimately, efforts like green

finance and sustainable financial services need to be promoted to leverage competitive advantages while fulfilling the sustainable development mandates set by the government and the international community.

For banks in Vietnam, they must enhance their abilities to handle sustainability initiatives via professional training and international collaboration to gain insights from the experiences of banks in developed economies. Bank management should create a clear plan to include sustainable development goals in their operations to reduce negative impacts during the initial stages of implementation. The government needs to provide preferential policies, including tax exemptions and financial assistance for banks, to efficiently execute sustainable responsibility initiatives.

For Sector regulators, they must maintain a consistent macroeconomic policy, particularly by managing inflation, to mitigate the adverse impacts of price fluctuations on bank assets. They should implement strategies to enhance economic development. This will enhance financial stability, particularly for smaller and more vulnerable institutions.

The research has several limitations. This research utilizes data from commercial banks in China and Vietnam in a specific period. Consequently, the findings may not accurately reflect the whole banking sector in other countries or in different periods. Utilizing comprehensive metrics to assess sustainability (SB) may not adequately reflect the extent of banks' efforts in environmental, social, and governance responsibilities. The author proposes several avenues for future research: (i) The research can be extended by collecting data from other countries and over more time periods to compare and assess the differences between financial markets; or (ii) further studies can use advanced econometric models to further analyze the nonlinear relationship between sustainable development and financial stability; or (iii) the research should focus on assessing internal management factors, such as risk management strategies and SB implementation effectiveness, to identify success factors in sustainable development.

References

- Akerlof, G. A. (1970). The market for "lemons": Quality uncertainty and the market mechanism. *The quarterly journal of economics*, 84(3), 488-500. <https://doi.org/10.2307/1879431>.
- Alvarado, R., Tillaguango, B., Dagar, V., Ahmad, M., Işık, C., Méndez, P. and Toledo, E. (2021). Ecological footprint, economic complexity and natural resources rents in Latin America: Empirical evidence using quantile regressions. *Journal of Cleaner Production*, Vol. 318, pp.128585. <https://doi.org/10.1016/j.jclepro.2021.128585>.
- Azmi, W., Hassan, M.K., Houston, R. and Karim, M.S. (2021). ESG activities and banking performance: International evidence from emerging economies. *Journal of International Financial Markets, Institutions and Money*, Vol. 70, pp.101277. <https://doi.org/10.1016/j.intfin.2020.101277>.
- Barney, J. (1996). The resource-based theory of the firm. *Organization Science*, 7(5), 469-469. <https://doi.org/10.1287/orsc.7.5.469>.
- Carroll, A. B., & Shabana, K. M. (2010). The business case for corporate social responsibility: A review of concepts, research and practice. *International journal of management reviews*, 12(1), 85-105. <https://doi.org/10.1111/j.1468-2370.2009.00275.x>.
- Cornett, M. M., Erhemjamts, O., and Tehranian, H. (2016). Greed or good deeds: An examination of the relation between corporate social responsibility and the financial performance of US commercial banks around the financial crisis. *Journal of Banking & Finance*, vol. 70, no., pp. 137-159. <https://doi.org/10.1016/j.jbankfin.2016.04.024>.
- Demirgüç-Kunt, A., Detragiache, E., & Tressel, T. (2008). Banking on the Principles: Compliance with Basel Core Principles and Bank Soundness. *Journal of Financial Intermediation*, 17, 511-42.

- Djalilov, K., & Hartwell, C. (2024). Do social and environmental capabilities improve bank stability? Evidence from transition countries. In *Global Environmental Politics and International Organizations*, (pp. 60-82). Routledge. ISBN: 9781032704128.
- Freeman, R. E. (1984). Strategic management: A stakeholder approach. *Cambridge University Press*, .
- Galant, A., and Cadez, S. (2017). 'Corporate social responsibility and financial performance relationship: A review of measurement approaches'. *Economic*, .
- Giannarakis, G., Konteos, G., Zafeiriou, E., & Partalidou, X. (2016). The impact of corporate social responsibility on financial performance. *Investment Management and Financial Innovations*, 13(3), 171-182. [https://doi.org/10.21511/imfi.13\(3-1\).2016.03](https://doi.org/10.21511/imfi.13(3-1).2016.03).
- Hadiwibowo, I., & Purwanti, L. (2024). Corporate Social Responsibility and Firm Performance: A Literature Review. *Accounting and Finance Studies*, 4(3). <https://doi.org/10.47153/afs43.9702024>.
- Hafeez, B., Li, X., Kabir, M.H. and Tripe, D. (2022). Measuring bank risk: Forward-looking z-score. *International Review of Financial Analysis*, Vol. 80, pp.102039. <https://doi.org/10.1016/j.irfa.2022.102039>.
- Huang, G., Ye, F., Li, Y., Chen, L., & Zhang, M. (2023). Corporate social responsibility and bank credit loans: Exploring the moderating effect of the institutional environment in China. *Asia Pacific Journal of Management*, 40(2), 707-742. <https://doi.org/10.1007/s10490-021-09800-x>.
- Jain, A., Keneley, M., & Thomson, D. (2015). Voluntary csr disclosure works! evidence from asia-pacific banks. *Social Responsibility Journal*, 11(1), 2-18. <https://doi.org/10.1108/srj-10-2012-0136>.
- Khalifaoui, R., Arminen, H., Doğan, B. and Ghosh, S. (2023). Environment-growth nexus and corruption in the MENA region: Novel evidence based on method of moments quantile estimations. *Journal of Environmental Management*, Vol. 342, pp.118146. <https://doi.org/10.1016/j.jenvman.2023.118146>.
- Koenker, R., & Hallock, K. F. (2001). Quantile regression. *Journal of economic perspectives*, 15(4), 143-156. DOI: 10.1257/jep.15.4.143.
- Köhler, M. (2015). "Which banks are more risky? The impact of business models on bank stability". *Journal of Financial Stability*, Vol. 16 No., pp.195-212. <http://dx.doi.org/10.1016/j.jfs.2014.02.005>.
- Laeven, L. and Levine, R. (2009). "Bank governance, regulation and risk taking". *Journal of Financial Economics*, Vol. 93 No. 2, pp.259-275. <https://doi.org/10.1016/j.jfineco.2008.09.003>.
- London, J. D. (2013). Welfare regimes in the wake of state socialism: China and Vietnam. *Chinese social policy in a time of transition*, 18-47.
- Machado, J.A.F. and Santos Silva, J.M.C. (2019). Quantiles via moments. *Journal of Econometrics*, Vol. 213 No. 1, pp.145-173. <https://doi.org/10.1016/j.jeconom.2019.04.009>.
- Mangantar, M. (2019). The influence of corporate social responsibility and corporate governance on banking financial performance. *European Research Studies Journal*, XXII(Issue 3), 95-105. <https://doi.org/10.35808/ersj/1459>.
- Meckling, W. H., & Jensen, M. C. (1976). Theory of the Firm. Managerial Behavior, Agency Costs and Ownership Structure. ., .
- Nguyen, T. D., & Dinh, H. T. (2024). Economic structural transformation: The Vietnamese case for developing nations in a globalization context. *Journal of Infrastructure, Policy and Development*, 8(4), 4261. <https://doi.org/10.24294/jipd.v8i4.4261>.

- Saadaoui, A. and Salah, O. (2023). The moderating effect of financial stability on the csr and bank performance. *Euromed Journal of Business*, 18(4), 621-642. <https://doi.org/10.1108/emjb-10-2021-0163>.
- Shahid, R., & Zeb, S. (2022). Importance of Corporate Social Responsibility in the Banking industry of Pakistan. *Journal of Workplace Behavior*, 3(2), 21-33. <https://doi.org/10.70580/jwb.03.02.0138>.
- Shapiro, S.S. and Wilk, M.B. (1965). "An analysis of variance test for normality (complete samples)". *Biometrika*, Vol. 52 No. 3-4, pp.591-611. <https://doi.org/10.1093/biomet/52.3-4.591>.
- Stiroh, K. (2004). "Diversification in banking: Is noninterest income the answer?". *Journal of Money, Credit, and Banking*, Vol. 36 No. 5, pp.853-882. <https://www.jstor.org/stable/3839138>.
- Thuong, D. (2024). The Joint Effect of Corporate Social Responsibility and Digital Transformation on Bank Performance: Evidence from Vietnam'S Banking Sector. *JLISS*, Vol.11/No.12/Vol.11.No.12.16. <http://www.aasmr.org/liss/Vol.11/No.12/Vol.11.No.12.16.pdf>.
- Vo, D. H., Van, L. T. H., Dinh, L. T. H., & Ho, C. M. (2020). Financial inclusion, corporate social responsibility and customer loyalty in the banking sector in Vietnam. *Journal of International Studies*, (2071-8330), 13(4).
- Wu, M. W., & Shen, C. H. (2013). Corporate social responsibility in the banking industry: Motives and financial performance. *Journal of Banking & Finance*, 37(9), 3529-3547. <https://doi.org/10.1016/j.jbankfin.2013.04.023>.
- Yang, M., Maresova, P., Akbar, A., Bento, P., & Liu, W. (2021). Convergence or disparity? A cross-country analysis of corporate social responsibility reporting for banking industry in Nordic countries and China. *Sage Open*, 11(3). <https://doi.org/10.1177/21582440211029933>.
- Yuen, M. K., Ngo, T., Le, T. D. Q., & Ho, T. H. (2022). The environment, social and governance (ESG) activities and profitability under COVID-19: evidence from the global banking sector. *Journal of Economics and Development*, 24(4), 345-364. .
- Zhou, G., Sun, Y., Luo, S., & Liao, J. (2021). Corporate social responsibility and bank financial performance in China: The moderating role of green credit. *Energy Economics*, 97, 105190.