

Note: This is Online Appendix 1 of Khatatbeh, I.N., Tayeh, M., Freihat, A.F. & Aldeki, R.G., 2025, 'ESG and bank stability in Gulf Cooperation Council countries: Empirical evidence from listed commercial banks', *South African Journal of Economic and Management Sciences* 28(1), a6287. <https://doi.org/10.4102/sajems.v28i1.6287>

Online Appendix 1

TABLE 1-A1: Variables, definitions and sources

Variable code	Full variable name	Definition	Source
LZscore	Bank Stability Z-Score	'Natural Logarithm of Z-score measured by return on asset plus the ratio of equity to total assets ,all divided by the standard deviation of the return on assets.'	Thomson Reuters' Refinitiv database
ESG	Aggregate ESG score	'A composite score evaluating a company's performance across environmental, social, and governance dimensions.'	Bloomberg
Environmental	Environmental Score	'Assesses a company's impact on the environment, including resource usage, emissions, and waste management.'	Bloomberg
Social	Social Score	'Evaluates a company's social practices, such as labor relations, community engagement, and human rights.'	Bloomberg
Governance	Governance Score	'Measures the quality of a company's governance structures, including board composition and shareholder rights.'	Bloomberg
EF	Economic Freedom	'The Economic Freedom Index (EFI), developed by the Heritage Foundation, measures a country's economic liberty across 12 factors in rule of law, government size, regulatory efficiency, and open markets. Each of the 12 components is graded on a scale from 0 to 100, and the overall EFI score is the average of these scores.'	The Heritage Foundation.
LSize	Logarithm of Bank Size	'The natural logarithm of a bank's total assets.'	Thomson Reuters' Refinitiv database
Income diversity	Income Diversification Index	'The ratio of non-interest income to total operating income'	Thomson Reuters' Refinitiv database
GDP growth	Gross Domestic Product Growth Rate	'The annual percentage increase in a country's economic output.'	World Bank DataBank
Inflation	Inflation Rate	'The annual percentage change in the general price level of goods and services.'	World Bank DataBank

TABLE 2-A1: Sample empirical studies on ESG and bank stability

Author(s)	Country/data	Method	Research focus	Key Findings
Middle East				
Mateev et al. (2024)	575 banks in MENA countries	Fixed/Random effects, GMM estimator	Examine how market efficiency and intensity affect bank stability during COVID-19	Efficiency enhances performance and stability; market intensity negatively impacts profitability. Market intensity—not efficiency—determines bank stability. Islamic banks with higher efficiency performed better than conventional banks during the pandemic.
Alghafes et al. (2024)	Islamic banks in GCC countries	GMM estimator	Investigate ESG aspects' impact on financial outcomes	Governance and social factors positively influence financial metrics, whereas environmental factors have a less immediate effect.
Tumewang et al. (2024)	Islamic and conventional banks in 11 countries	Panel regression model	Analyse the relationship between diversity, inclusion, and ESG performance	A diverse and inclusive workplace significantly enhances ESG outcomes, with notably stronger effects in Islamic banks.
Asia and emerging markets				
Yin et al. (2024)	China	Panel two-way fixed-effects and quadratic function models	Examine nonlinear relationships between transmission mechanisms and ESG performance	A U-shaped relationship exists between ESG performance and financial technology.
Weber and Oni (2015)	Chinese, Nigerian, and Bangladeshi banks	Regression analysis	Examine connections between financial sector activities and sustainable development	No significant link between sustainability practices and NPLs. Contextual factors moderate ESG-stability relationships. Environmental initiatives enhance cash flows and reduce equity costs but not debt costs.
Azmi et al. (2021)	44 emerging economies	GMM estimator	Analyse ESG's impact on bank value	A nonlinear relationship: moderate ESG activities increase bank value, whereas high ESG levels yield diminishing returns.
Abbas et al. (2024)	Japanese banks	Two-step GMM and Ordinary Least Squares methods	Examine how economic freedom affects banks' risk-taking behaviour	Economic freedom increases banks' risk-taking, consequently enhancing stability.
Karim et al. (2022)	Pakistan	System-GMM estimator	Investigate effects of sustainable banking regulations	Positive impacts on bank profitability and market returns. Sustainable banking regulations enhanced financial stability, especially during COVID-19.
Xie et al. (2022)	Emerging Asian economies	Regression models	Assess COVID-19's impact on banking sector performance	Bank performance positively related to GDP and bank size before and during the pandemic, though with reduced significance during the pandemic. Asian banks were substantially impacted by COVID-19.

Europe				
Saidane and Ben Abdallah (2020)	61 European banks	Panel Vector Autoregressive (PVAR), GMM method, and Granger causality tests	Explore two-way relationship between bank stability and sustainability	Sustainability enhances stability, but stability poses challenges to maintaining environmental and governance sustainability.
Bouattour et al. (2024)	European banks	Regime-switching model	Analyse ESG's impact on bank stability	Nonlinear relationship moderated by digital transformations; higher ESG performance correlates with lower bank fragility in the digital era.
Di Tommaso and Thornton (2020)	European banks	Dynamic GMM estimator	Investigate ESG scores' influence on banks' risk-taking and valuation	Low risk-taking is linked to high ESG scores but potentially lowers bank value, underscoring a trade-off between risk reduction and value preservation.
Global insights				
Arnone et al. (2024)	Global banking sector	Comprehensive literature review	Explore ESG integration within banking processes	ESG adoption enhances bank stability and supports banks' roles as ESG investment facilitators and risk managers.
Citterio and King (2023)	362 commercial banks in the US and EU-28	LDA, AI methods (DT and SVM), Ensemble methods (RF and XGBoost)	Assess ESG indicators' predictive ability for bank distress	Integrating ESG measures with conventional financial indicators significantly improves bank distress prediction accuracy.
Sendi (2024)	Europe, the Americas, Oceania, and Asia	Pooled and fixed-effects regression models	Evaluate market responses to ESG performance	Financial markets increasingly internalise ESG performance.
Elnahass et al. (2021)	1,090 banks across 116 countries	Panel data regression models	Investigate COVID-19's impact on global banking stability and recovery signals	COVID-19 negatively impacted global banking stability initially, with stability indicators beginning to recover in Q2 2020.

Note: For more information on the references mentioned in Table 2-A1, please refer to the article: Khatatbeh, I.N., Tayeh, M., Freihat, A.F. & Aldeki, R.G., 2025, 'ESG and bank stability in Gulf Cooperation Council countries: Empirical evidence from listed commercial banks', *South African Journal of Economic and Management Sciences* 28(1), a6287. <https://doi.org/10.4102/sajems.v28i1.6287>.