Factors Influencing the Stability of Commercial Banks in Mongolia

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Enkhtuvshin Dalantaibaatar[1]

Gunbileg Ganbayar[2]

Gerelt-Od Uvgunkhuu[3]

Abstract

This study examines the internal and macroeconomic determinants of bank stability in Mongolia using a dynamic panel data framework. Focusing on ten commercial banks over the period 2014–2024, the analysis employs a system Generalized Method of Moments (GMM) estimator to address endogeneity, unobserved bank-specific heterogeneity, and dynamic adjustment effects. Bank stability is measured using the Z-score, while the explanatory variables include key bank-specific characteristics, such as deposit structure, liquidity, lending activity, credit risk, and efficiency, alongside macroeconomic indicators of economic growth and inflation. The system GMM results indicate limited persistence in bank stability, suggesting that stability adjusts rapidly to contemporaneous bank-specific fundamentals and macroeconomic conditions rather than being strongly path dependent. Among internal factors, the deposit ratio and non-performing loan ratio exert significant negative effects on bank stability, underscoring the destabilizing role of excessive reliance on deposits and credit risk. In contrast, higher lending activity is found to enhance stability, reflecting improved income generation when credit risk is effectively managed. Operational inefficiency is associated with lower stability, underscoring the importance of sound cost and revenue management. Macroeconomic conditions also play a significant role. GDP growth is negatively associated with bank stability, indicating potential risk-taking and credit expansion during economic booms. In contrast, inflation is positively associated, suggesting that moderate inflation may support bank earnings and balance-sheet strength in the short run. Standard diagnostic tests confirm the validity of the system GMM specification and the robustness of the estimated results.

Keywords

Commercial Banks, Bank Stability, System GMM, Mongolia.

[1, 2]Senior Lecturer, Finance Department, Business School, National University of Mongolia
[3]Associate Professor, Finance Department, Business School, National University of Mongolia
Corresponding author:
Enkhtuvshin Dalantaibaatar, Email: enkhtuvshind@num.edu.mn

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Introduction

The stability of the banking sector is widely recognized as a cornerstone of financial system resilience, a point that gained heightened emphasis following the 2007–2009 global financial crisis, during which weaknesses in banking regulation exposed systemic vulnerabilities globally (Nier, 2009; Basel Committee, 2010) and in Mongolia, where the bankrupts of two commercial banks highlighted the critical need for robust financial stability in Mongolia. Commercial banks perform a central role in financial intermediation by mobilizing savings, allocating credit, facilitating payments, and managing risks. Instability in the banking sector can disrupt these core functions, amplify macroeconomic shocks, and transmit financial distress to the real economy, as evidenced by recurrent global and regional banking crises. Consequently, understanding the determinants of bank stability has become a critical concern for policymakers, regulators, and scholars (Berger & DeYoung, 1997; Athari et al., 2023).

In the empirical banking literature, bank stability is commonly proxied by the Z-score, which captures the distance to insolvency by combining profitability, capitalization, and earnings volatility. A higher Z-score indicates a lower probability of bank failure and greater financial soundness. This measure has been extensively applied in both developed and developing-country contexts due to its intuitive interpretation and strong theoretical grounding (Pham et al., 2021; Yitayaw et al., 2023). Existing studies consistently show that bank stability is shaped by a combination of internal bank-specific characteristics - such as capital adequacy, asset quality, liquidity, efficiency, and funding structure - and external macroeconomic and institutional conditions (Tariq et al., 2021; Hajdini & Hoti, 2025).

A growing body of empirical evidence highlights the importance of internal determinants in explaining cross-bank differences in stability. Credit risk, typically measured by non-performing loans (NPLs), has been identified as one of the most critical sources of instability, as deteriorating asset quality erodes profitability and weakens balance sheets (Berger & DeYoung, 1997; Sang Tang My, 2020). Funding structure and liquidity management also play a central role, particularly in deposit-dominated banking systems, where excessive reliance on deposits or aggressive deposit pricing may increase vulnerability to funding shocks (Al-Homaidi et al., 2019; Ozili, 2025). Moreover, operational efficiency influences banks' capacity to absorb shocks and adapt to changing economic conditions, with inefficient banks being more prone to distress (Yitayaw et al., 2023).

Recent studies increasingly emphasize the dynamic nature of bank stability and the presence of endogeneity between stability and its determinants. Bank risk-taking, profitability, and funding decisions are often jointly determined with stability outcomes, rendering OLS panel estimators inadequate. To address these challenges, the dynamic panel-data framework based on the Generalized Method of Moments (GMM) has become standard in the literature (Arellano & Bond, 1991; Blundell & Bond, 1998). System GMM, in particular, offers efficiency gains when variables exhibit persistence and when the

cross-sectional dimension is limited, as is typical in banking studies (Roodman, 2009). Empirical applications using system GMM indicate that properly accounting for dynamic relationships and endogeneity changes the conclusions drawn about the determinants of bank stability (Pham et al., 2021; Yitayaw et al., 2023).

Despite the expanding international literature, evidence on the determinants of bank stability in small, emerging, and resource-dependent economies remains limited. Mongolia provides a particularly relevant case. Its banking system is highly concentrated, and the commercial banks dominate the financial system. Periods of rapid economic expansion have often coincided with credit booms, while downturns have exposed vulnerabilities in asset quality and bank balance sheets. These structural characteristics raise important questions about how internal bank-specific factors and macroeconomic conditions shape the stability of Mongolian commercial banks.

This study examines the internal determinants of commercial bank stability in Mongolia using an unbalanced panel of banks over the period 2014–2024. Bank stability is measured using the Z-score, and the analysis focuses on key internal factors, including bank concentration, funding structure, liquidity, pricing behavior, credit risk, and operational efficiency, while controlling macroeconomic conditions. Methodologically, the study employs a dynamic system GMM estimator to address endogeneity, unobserved heterogeneity, and adjustment dynamics inherent in bank stability models.

The remainder of the article is structured as follows: Section 2 reviews the literature on banking profitability and develops hypotheses; Section 3 describes the data and explains the methodology employed; Section 4 discusses the data analysis and empirical findings; and Sections 5 and 6 present the conclusion and policy implications.

Literature Review

Pham et al. (2021) investigate the determinants of commercial bank stability in Vietnam during 2010–2018 using the system GMM estimator. Bank stability is proxied by the Z-score, a standard measure of insolvency risk. The empirical results reveal that past stability is positively correlated with current stability, indicating dynamic persistence in the banking system. Equity-to-asset ratio, bank size, loans-to-assets ratio, revenue diversification and macroeconomic factors exert a positive influence on bank stability. Furthermore, foreign investment correlates positively with bank stability, while market share of mobilized capital, loan loss provisions, and specific aspects of market structure show negative effects, highlighting risk factors that weaken stability.

Yitayaw et al. (2023) examine the internal and external determinants of commercial bank stability in Ethiopia, using panel data from 2014 to 2020 and the Two-Step System GMM method. Bank stability is measured using the Z-score, and the empirical findings demonstrate that the bank lending rate, asset tangibility, GDP growth rate, control of corruption, and the effectiveness of the rule of law are positively and significantly associated with higher bank stability. These effects are particularly pronounced for banks with a high market share of mobilized capital, indicating that both internal performance

and institutional quality matter for resilience. Conversely, bank concentration and efficiency have negative and statistically significant effects on stability, suggesting that greater concentration and inefficiency may undermine soundness. The analysis also shows that the historical level of bank stability positively impacts current stability, indicating dynamic persistence in the Ethiopian context. The study provides policy insights to strengthen bank risk management and enhance institutional governance, thereby improving financial stability in developing banking systems.

Hajdini & Hoti (2025) analyze the determinants of bank stability across Eurozone countries over the period 2006–2021, incorporating both bank-specific and macroeconomic factors employing the Hausman–Taylor model. Bank stability is proxied by the Z-score. The empirical results identify that capitalization, asset quality, profitability, liquidity, and operational efficiency exhibit a positive effect on Z-scores. Macroeconomic conditions of GDP growth, inflation, and economic integration also play important roles, reflecting the broader influence on bank soundness. The findings underscore that both internal bank fundamentals and external economic conditions jointly shape banking stability in advanced economies. The study further provides insights for policymakers and regulators on balancing micro-prudential and macroeconomic policies to sustain banking-sector resilience in the Eurozone.

Sang Tang My (2020) investigates the relationship between credit risk and bank stability in Vietnam's commercial banking system, using panel data from 2005 to 2019. The empirical results demonstrate that higher NPLs negatively affect both bank performance and stability. The mediation analysis suggests a partial mediation effect: credit risk affects stability both directly and indirectly through its impact on bank performance. Higher credit risk tends to reduce performance, which in turn weakens stability. Past profitability and past stability are positively correlated with current stability, indicating dynamic effects in bank soundness. The study highlighted that credit risk management is central to maintaining bank stability in Vietnam and reducing NPLs and improving operational performance are key to strengthening resilience in emerging market banking systems.

Tariq et al. (2021) evaluate the influence of bank life cycle or bank maturity on income diversification and stability, as well as the relationship between income diversification and bank stability. Dataset includes Pakistani commercial banks’ financial statements over the period 2005 to 2019. The authors applied FE and GMM methods and found that bank maturity leads to enhanced income distribution, and income diversification strongly influences bank stability.

Birhan & Kaur (2025) examine the bank-specific determinants of bank risk-taking in the Ethiopian banking sector over the period 2010-2011 and 2021-2022, using a combination of static and dynamic panel estimation techniques applied to bank financial statement data. The authors analyze how internal characteristics influence a bank’s risk profile, with particular focus on size, human capital efficiency, loan growth, and the loan-to-deposit ratio. The empirical results indicate that bank size is inversely related to risk, suggesting that larger banks take on less risk. Human capital efficiency and the loan-to-deposit ratio

are also negatively and significantly associated with bank risk, suggesting that banks with more efficient human resource utilization and more conservative funding structures exhibit lower risk-taking behavior. In contrast, higher loan growth is associated with increased bank risk, reflecting the riskiness of rapid credit expansion. The study further finds that bank capital ratio and income diversification are not significant determinants of bank stability in the Ethiopian context. Overall, the study underscores the importance of internal management practices and funding choices in influencing risk behavior in emerging market banks and highlights implications for risk management strategies and regulatory oversight.

Ozili (2025) investigates non-traditional determinants of financial stability in the wake of recent banking crises, using panel data from 61 countries over 2009–2021 and a first-difference panel GMM approach to address endogeneity and dynamic effects. The author examines how factors such as financial inclusion, inflation, and the loan-to-deposit ratio influence financial stability beyond conventional bank and macroeconomic variables. Key findings reveal that past financial stability positively predicts future stability, indicating persistence in stability dynamics across regions. A higher loan-to-deposit ratio improves financial stability in Europe and the Americas, while financial inclusion enhances stability in high-inflation environments, particularly in Africa and the Americas. However, during recessions - especially in Asia - high levels of financial inclusion are associated with lower stability. Moreover, combined high inflation and high financial inclusion, coupled with a high loan-to-deposit ratio, are linked to reduced stability in some regions, suggesting that inflation can weaken the stabilizing effects of inclusion and funding structure. To conclude, the author highlights the complex and regionally heterogeneous effects of non-traditional determinants such as financial inclusion and inflation on financial stability and underscores the importance of broadening risk assessment frameworks in light of recent banking-sector stress.

Garcia & Abreu (2024) examine the key determinants of banking stability in Portugal over the period 2010–2019 using an aggregated banking stability index constructed from a set of financial soundness indicators. The authors first construct the index to capture overall banking stability at the quarterly level and then assess its drivers by classifying potential explanatory variables into macroeconomic and financial categories. Empirical results indicate that both macroeconomic and financial variables are significant predictors of banking stability in Portugal. Among macroeconomic indicators, the growth of the consumer price index (CPI) is widely recognized as a significant early warning indicator, underscoring the link between inflation dynamics and financial soundness. In terms of financial determinants, indicators such as the ratio of the second money multiplier to GDP are significant, highlighting the role of monetary and liquidity conditions in shaping stability outcomes. Overall, the study contributes to the literature by providing country-specific evidence on determinants of stability and demonstrating the usefulness of combining financial soundness measures with macroeconomic indicators for understanding banking-sector resilience in advanced economies.

Athari et al. (2023) study how country-specific risks, specifically political, economic, and financial risks affect banking sector stability across a global sample of 107 countries over the period 2004–2017, using a dynamic panel data approach (system GMM). The authors investigate not only the overall impact of country risk on stability but also whether this relationship varies by country income level (low, middle, high) and by risk environment (low vs. high domestic risk). The findings indicate that reducing a country's vulnerability to political, economic, and financial risks enhances banking-sector stability. This positive effect is more pronounced as countries move from low- to middle- and high- income status. Declines in country risk also improve stability in both low- and high-risk environments, although the effect is more potent in low-risk countries. Furthermore, the study shows that both banking sector-specific factors and country-level determinants significantly influence stability. However, the magnitude and direction of these effects vary across income and risk groups. Overall, the paper contributes to the literature by providing global evidence that country's risk matters for banking stability, and that its impact depends on broader economic and institutional contexts. The results have implications for policymakers and regulators seeking to strengthen financial system resilience through risk mitigation strategies.

Internal Determinants of Bank Stability

Bank stability is commonly defined as the ability of banks to withstand shocks while maintaining their core intermediation functions. The empirical banking literature identifies internal bank-specific factors - such as capital adequacy, credit risk, efficiency, liquidity, and balance-sheet structure - as primary drivers of stability. These internal factors are closely linked to managerial decisions and risk-taking behavior and therefore play a central role in explaining cross-bank differences in financial soundness.

Bank size plays a crucial role in sustaining bank stability. However, the relationship between bank size and stability is theoretically indeterminate. On one hand, larger banks may exhibit greater stability due to economies of scale, diversification benefits, better access to funding, and enhanced risk-management capacity (El Moussawi & Mansour, 2022). On the other hand, increased size may encourage greater risk-taking through moral hazard, complexity, and "too-big-to-fail" incentives, potentially undermining stability ("risk-shifting" view). Given these competing channels, the net effect of bank size on stability is an empirical question. As a bank size, we proxy the share of bank assets in the aggregate assets of the banking industry (Yitayaw et al., 2023). In small and emerging banking systems, market concentration is typically high, with a few large banks accounting for a substantial share of total banking assets. Cross-country evidence shows that leading banks may individually hold double-digit shares of system assets, while average bank asset shares are considerably higher than in advanced economies.

H1: Commercial bank stability is significantly influenced by the degree of bank concentration.

A higher deposit ratio may enhance bank stability by providing a low-cost, reliable source of funding and reducing reliance on volatile wholesale financing. However, excessive dependence on deposits - particularly short-term or concentrated deposits - may increase liquidity risk and expose banks to funding pressure during periods of economic stress. Given these opposing channels, the overall impact of the deposit ratio on bank stability is theoretically ambiguous and must be determined empirically.

H2: A higher bank deposit ratio is associated with lower stability of commercial banks in Mongolia.

Liquidity and funding structure further influence stability by affecting banks' ability to meet short-term obligations. Excessive reliance on unstable funding sources can increase liquidity risk, while prudent loan-to-asset ratios support balance-sheet resilience. Al-Homaidi et al. (2019) and Tariq et al. (2021) demonstrate that bank-specific liquidity measures significantly affect financial stability, particularly in systems in which deposit funding predominates.

H3: A higher loan-to-asset ratio has a significant effect on bank stability, reflecting balance sheet risk exposure.

Higher deposit rates may enhance bank stability by attracting and retaining deposits, thereby strengthening funding capacity and liquidity. However, elevated deposit rates can also increase funding costs, compress interest margins, and incentivize risk-taking to maintain profitability, potentially undermining stability. Moreover, aggressive deposit pricing may signal funding stress or intensify competition for deposits, increasing vulnerability during adverse conditions. Given these competing mechanisms, the net effect of the deposit rate on bank stability is an empirical question. Higher deposit rates raise funding costs and may reflect riskier funding strategies, thereby weakening bank stability.

H4: Higher deposit rates reduce the stability of commercial banks.

Higher lending rates may enhance bank stability by increasing interest margins, strengthening profitability, and improving banks' capacity to absorb shocks. Conversely, elevated lending rates can weaken borrowers' repayment capacity, increase credit risk, and contribute to higher non-performing loans, thereby undermining bank stability. Given these opposing channels, the overall effect of lending rates on bank stability is theoretically ambiguous and must be determined empirically. Higher lending rates increase income and interest margins, thereby supporting bank stability when credit risk is effectively managed.

H5: Higher lending rates are associated with greater stability of commercial banks.

Credit risk is another central internal determinant of bank stability. High levels of NPLs weaken asset quality, erode profitability, and increase the likelihood of bank distress.

Berger & DeYoung (1997) provide early evidence that problem loans and inefficiencies reinforce one another, creating a feedback loop that undermines bank stability. More recent dynamic panel studies confirm that rising NPL ratios significantly reduce bank stability, particularly in emerging markets where credit cycles are pronounced (Pham et al., 2021; Sang Tang My, 2020)

H6: Higher credit risk, measured by nonperforming loans, reduces bank stability.

Operational efficiency also plays an important role in determining bank stability. Efficient banks are better able to control costs, allocate resources effectively, and adapt to changing economic conditions. Empirical studies suggest that inefficiency increases vulnerability to shocks and amplifies credit risk. Yitayaw et al. (2023) define operational efficiency as non-interest expense relative to non-interest income and find that efficiency indicators are strongly associated with bank stability in emerging economies, even after controlling for endogeneity and dynamic effects.

H7: Greater operational efficiency enhances bank stability, while inefficiency weakens it.

Although this study focuses on internal factors, macroeconomic conditions shape the environment in which banks operate and therefore indirectly influence stability. Economic growth affects borrowers' repayment capacity and banks' credit risk exposure, while inflation influences real returns on assets and liabilities. Empirical evidence suggests that inflation and economic growth exert significant effects on bank stability, especially in small open economies subject to external shocks (Athari et al., 2023). Consequently, most stability models include macroeconomic controls to isolate the effects of internal bank characteristics.

H8-9: Macroeconomic conditions, particularly economic growth positively and inflation negatively affect bank stability.

Data and Methodology

This study investigates the internal determinants of commercial bank stability using an unbalanced panel dataset spanning 2014–2024. Bank stability is proxied by the Z-score, which measures the distance to insolvency and captures the joint effects of profitability, capitalization, and earnings volatility. The use of the Z-score is consistent with the standard banking stability literature and facilitates comparability across institutions and over time.

Bank-specific explanatory variables are selected based on prior empirical evidence and data availability. These include bank concentration, deposit ratio, liquidity ratio, deposit rate, lending rate, non-performing loans, and operational efficiency. All bank-level variables are constructed from publicly available financial statements obtained from the

official websites of individual commercial banks. A complete list of the sampled banks and data sources is reported in Appendix 1.

Bank concentration is measured as each bank's share of total assets relative to the aggregate assets of the banking industry. Industry-level asset data are obtained from the Bank of Mongolia (BOM). Since bank-level market deposit and lending rates are not directly disclosed, proxy variables are employed. The deposit rate is approximated by the ratio of interest expenses to total deposits. In contrast, the lending rate is proxied by the ratio of interest income to total loans, following established practice in the banking literature.

To control macroeconomic conditions, gross domestic product (GDP) growth and inflation are included in the empirical specification. These variables capture the influence of the broader economic environment on bank stability. Table 1 reports the definitions of all variables, their measurement, and the expected signs of their associations with bank stability.

Table 1. The Variable Descriptions and Expected Hypotheses

	Variables	Abbs	Formula	Expectations
Dependent Variables				
	Bank Stability	Z	Z-score=(ROA+CAD)/ Sigma (ROA)	
Independent variables				
1	Bank Concentration	BC	Bank Assets/ Aggregate Assets of Banking Industry	H1 (+)
2	Deposit Ratio	DEP	Deposits/ Total Assets	H2 (-)
3	Liquidity Ratio	LIQ	Loans/ Total Assets	H3 (+/-)
4	Deposit Rate	DR	Interest Expense/ Total Deposits	H4 (-)
5	Lending Rate	LR	Interest Income/ Loans	H5 (+)
6	Non-Performing Loans	NPL	Non-Performing Loans/ Loans	H6 (-)
7	Efficiency	EFF	Non-Interest Expense/ Non-Interest Income	H7 (+)
8	Gross Domestic Products	GDP	Annual GDP Growth	H8 (+)
9	Inflation	INF	Change in Consumer Price Index	H9 (-)

Source: Authors' compilation

Empirical Model

A major methodological challenge in estimating bank stability models arises from endogeneity, unobserved heterogeneity, and dynamic adjustment. Bank stability indicators often exhibit persistence over time, while internal factors such as credit risk, capital ratios, and efficiency are jointly determined with stability outcomes. Static panel estimators fail to address these issues and may yield biased results.

Dynamic panel-data estimators based on the Generalized Method of Moments have become standard in the banking literature. Arellano & Bond (1991) introduce difference GMM to address endogeneity using internal instruments, while Blundell & Bond (1998) extend this framework to system GMM, improving efficiency in panels with persistent variables. Roodman (2009) provides practical guidance on implementing system GMM and highlights the importance of controlling instrument proliferation.

Recent studies on bank stability increasingly rely on system GMM to obtain consistent estimates. Pham et al. (2021) and Yitayaw et al. (2023) employ dynamic GMM estimators to analyze determinants of stability and demonstrate that accounting for dynamics and endogeneity materially alters inference relative to static models. These studies underscore the suitability of system GMM for banking panels with limited cross-sectional units and moderate time dimensions.

Given the presence of a lagged dependent variable and the potential endogeneity of key bank-level regressors, the model is estimated using the system GMM estimator to examine the internal determinants of commercial bank stability in Mongolia. This approach combines equations in first differences and levels, using appropriately lagged internal instruments to address simultaneity, reverse causality, and unobserved heterogeneity. Instrument proliferation is controlled by collapsing instruments and restricting lag depth.

This study estimates a dynamic panel model of the following form:

$$Z_{it} = \alpha * Z_{i,t-1} + \beta * X_{it} + \gamma * M_t + \mu_i + \varepsilon_{it} \quad (1)$$

where Z_{it} denotes the bank stability indicator of the commercial bank i at the time period t; Z_{it-1} is the stability of the bank i at the time period $t-1$, which captures the dynamic adjustment; X_{it} is a vector of bank-specific variables; M_t represents macroeconomic controls; μ_i denotes unobserved bank-specific effects, and ε_{it} is an idiosyncratic error term. i is the bank number, and t is the year in the model.

Diagnostic Tests

The validity of the system GMM model is evaluated using standard diagnostic tests. The Arellano–Bond AR(2) test is used to examine whether there is second-order serial correlation in the differenced residuals, which would invalidate the use of lagged variables as instruments. In addition, the validity of the instrument set is assessed using overidentification tests, such as the Hansen (or Sargan) test, which examines whether the instruments are uncorrelated with the error term and the unobserved bank-specific effects (Roodman, 2009). The results indicate the absence of second-order serial correlation and do not reject the null hypothesis of valid instruments, confirming that the system GMM specification is appropriate and that the estimated results are robust.

Data analysis and Empirical findings

In assessing the internal factors affecting the stability of nine commercial banks, 9 bank-specific and macroeconomic variables spanning 2014-2024 were employed, yielding 93 observations. Table 2 presents the descriptive statistics of the observed data.

Table 2. Descriptive Statistics

Variables	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
Z	15.271	14.312	37.256	2.471	7.237	93
BC	0.108	0.089	0.331	0.002	0.101	93
DEP	0.744	0.785	0.881	0.389	0.114	93
LIQ	0.475	0.485	0.646	0.093	0.100	93
DR	0.067	0.068	0.134	0.006	0.023	93
LR	0.213	0.197	0.789	0.050	0.097	93
NPL	0.094	0.066	1.194	0.000	0.154	93
EFF	2.380	1.746	13.323	0.792	2.102	93
GDP	0.040	0.050	0.081	-0.044	0.035	93
INF	0.074	0.068	0.152	0.007	0.039	93

Source: Authors' calculation

The dependent variable, bank stability (Z), has a mean value of 15.271 and a median of 14.312, indicating a moderate level of financial stability across banks during the sample period. However, the wide range between the minimum (2.471) and maximum (37.256), along with a relatively high standard deviation (7.237), suggests substantial heterogeneity in stability across banks. This variation supports the use of panel data techniques that account for cross-bank differences.

Bank concentration (BC) has a mean of 0.108, implying that, on average, banks' average share in the banking system is approximately 10.8%. The relatively low minimum value (0.002) and noticeable dispersion indicate their difference in size.

The deposit ratio (DEP) has a mean of 0.744, indicating that Mongolian banks are predominantly deposit-funded. The narrow range and relatively low standard deviation suggest limited variation in deposit reliance across banks, which may partly explain the insignificant effect of deposit rates observed in the dynamic estimation.

Liquidity (LIQ) averages 0.475, indicating that liquid assets account for nearly half of total assets. Variations across banks reflect differences in liquidity management strategies, which may influence resilience to funding shocks.

The deposit rate (DR) has a mean of 6.7% and relatively low dispersion, suggesting fairly homogeneous deposit pricing across banks. This limited variation is consistent with the insignificant effect of deposit rates in the system GMM results.

The loan ratio (LR) averages 0.213, indicating that loans constitute approximately 21.3% of total assets. The wide range between the minimum (0.050) and maximum (0.789) highlights significant differences in lending intensity and balance-sheet structure across banks, which aligns with its statistically significant effect on stability in the regression results.

Credit risk, measured by the NPL ratio, has a mean of 9.4% but exhibits substantial dispersion, with a maximum exceeding 100% in 2021, driven by COVID-19. This high variability reflects episodes of severe deterioration in asset quality. It underscores the importance of credit risk as a destabilizing factor, consistent with its strong negative effect in the dynamic estimation.

The efficiency variable (EFF) exhibits substantial dispersion across banks, with a mean value of 2.380 and a relatively large standard deviation of 2.102. Measured as the ratio of non-interest expenses to non-interest income, this indicator reflects pronounced heterogeneity in operational performance among banks. The high variability suggests significant differences in cost management and revenue efficiency, which is consistent with the empirical finding that efficiency plays an important role in explaining bank stability. Banks with weaker operational efficiency are more vulnerable to shocks, whereas more efficient institutions are better positioned to maintain stability.

GDP growth averaged 4.0% but ranged from −4.4% to 8.1%, reflecting Mongolia's pronounced exposure to economic cycles and the impact of the COVID-19 shock during the sample period. Inflation averages 7.4%, with substantial temporal variation, indicating persistent price instability. The pronounced variability in these macroeconomic indicators underscores their relevance. It justifies their inclusion as control variables in the dynamic panel model to account for macro-financial conditions affecting bank stability.

The descriptive statistics reveal substantial heterogeneity in bank stability and key internal characteristics, as well as meaningful variation in macroeconomic conditions. These features support the use of a dynamic panel GMM approach to account for endogeneity, unobserved heterogeneity, and adjustment dynamics in the analysis of bank stability.

Table 3 presents the pairwise correlation matrix among the variables used in the empirical analysis, along with Variance Inflation Factors (VIFs) to assess potential multicollinearity. The correlation structure provides preliminary insights into the relationships between bank stability and its determinants, while indicating no serious multicollinearity concerns.

Table 3. Results of Pairwise Correlation and Variance Inflation Factor (VIF) analysis

Var.s	Z	BC	DEP	LIQ	DR	LR	NPL	EFF	GDP	INF
Z	1.00									
BC	0.27***	1.00								
DEP	-0.31***	0.31***	1.00							
LIQ	-0.26**	0.09	0.26**	1.00						
DR	-0.37***	-0.07	0.10	0.55***	1.00					
LR	0.23**	-0.20*	-0.19*	-0.59***	0.01	1.00				
NPL	-0.25**	-0.12	-0.17	-0.27***	0.13	0.16	1.00			
EFF	0.22**	-0.20*	-0.19*	-0.20*	-0.19*	0.59***	-0.17*	1.00		
GDP	-0.09	-0.03	-0.03	0.11	-0.14	-0.10	-0.24**	0.03	1.00	
INF	-0.03	-0.00	-0.02	0.14	-0.28***	-0.26**	-0.02	-0.10	0.51***	1.00
VIF		1.18	1.19	5.43	3.85	4.73	1.46	2.61	1.48	1.81

Note: *, **, *** significant at 10%, 5%, 1% level respectively.

Source: Authors' calculation

The dependent variable, bank stability (Z), exhibits statistically significant correlations with several internal bank-specific characteristics. Bank stability is positively correlated with bank concentration (BC), lending rate (LR), and non-interest efficiency (EFF), suggesting that banks with greater market importance, stronger income-generating capacity, and more efficient cost management tend to be more stable. In contrast, stability is negatively correlated with deposit reliance (DEP), liquidity (LIQ), deposit rates (DR), and NPL, indicating that heightened funding dependence, excessive liquidity holdings, higher funding costs, and elevated credit risk are associated with lower financial stability. Overall, these bivariate correlations are broadly consistent with the coefficient signs obtained from the system GMM estimation, providing preliminary support for the multivariate results.

Several correlations among the explanatory variables reflect expected balance-sheet trade-offs. In particular, the strong negative correlation between LIQ and LR indicates that banks holding higher levels of liquid assets tend to charge lower lending rates, consistent with a more conservative asset allocation and reduced reliance on higher-yield, riskier lending activities. This trade-off reflects the opportunity cost of liquidity holdings; whereby greater liquidity buffers constrain income generation from loans. More broadly, these correlations are consistent with standard banking theory and suggest that banks actively balance profitability, liquidity management, and risk exposure in shaping their balance-sheet strategies. Similarly, the strong positive correlation between LR and EFF suggests that banks with more active lending operations tend to generate higher income relative to non-interest expenses, reflecting more effective cost management and pricing strategies. This relationship indicates that banks that generate higher returns from lending are also better positioned to cover operating costs, thereby enhancing overall efficiency. Together, these correlations highlight the interconnected nature of lending activity, efficiency, and balance-sheet management in shaping bank performance. Deposit rates are positively correlated with liquidity, suggesting that banks may increase deposit rates to attract and retain funding during periods of heightened liquidity demand or when maintaining larger

liquidity buffers becomes more costly. This relationship is consistent with funding management strategies in which banks adjust deposit pricing to secure stable funding in response to balance-sheet liquidity needs.

Macroeconomic variables exhibit moderate correlations. GDP growth is negatively correlated with non-performing loans, indicating improved asset quality during economic expansions. Inflation (INF) is positively correlated with GDP growth, reflecting the cyclical nature of Mongolia's macroeconomic environment. Importantly, correlations between macroeconomic variables and bank-specific factors remain relatively modest, supporting their role as control variables rather than primary drivers.

Multicollinearity is further assessed using VIF Analysis. All VIF values are well below commonly accepted thresholds of concern (5 or 10), with the highest VIF observed for LIQ. These results indicate that multicollinearity is not severe and does not bias coefficient estimates or inflate standard errors in the regression analysis. The acceptable VIF levels support the reliability of the system GMM estimates.

To conclude, the correlation analysis confirms economically meaningful relationships among variables while indicating that multicollinearity is not a serious issue. The consistency between the correlation patterns and the dynamic GMM results strengthens confidence in the empirical findings and supports the robustness of the estimated relationships.

Estimation results

Table 4 reports the results of the dynamic panel-data estimation using the one-step system GMM. The Wald test strongly rejects the joint null hypothesis that all slope coefficients are equal to zero, indicating that the model exhibits strong overall explanatory power.

The coefficient on the lagged dependent variable (LZ) is positive but statistically insignificant, indicating limited persistence in bank stability after controlling for bank-specific characteristics, endogeneity, and macroeconomic conditions. This result suggests that bank stability in Mongolia adjusts relatively quickly to contemporaneous conditions rather than being strongly path dependent. Consequently, current managerial decisions and prevailing economic conditions appear to dominate historical stability effects, which is consistent with a banking system characterized by active balance-sheet adjustment and effective regulatory oversight.

Consistent with this finding, the system GMM estimates indicate that internal bank-specific fundamentals rather than past stability, are the principal drivers of bank stability in Mongolia. Stability responds rapidly to changes in credit risk, funding structure, operational efficiency, and macroeconomic conditions, underscoring the dominant role of contemporaneous balance-sheet management over historical stability effects.

Table 4. One-Step System GMM Estimation Result

Explanatory Variables	Coefficient	Standard Error	P-value
LZ (-1)	0.049	0.130	0.704
BC	-16.531	35.606	0.642
DEP	-16.692***	5.467	0.002
LIQ	0.661	9.597	0.945
DR	-25.577	40.120	0.524
LR	32.447***	8.899	0.000
NPL	-10.100***	3.329	0.002
EFF	-0.613**	0.280	0.029
GDP	-30.577***	9.222	0.001
INF	26.797***	9.861	0.007
C	33.681**	14.046	0.016
Number of Observations	85	**Number of Groups**	9
Number of Instruments	35	**Wald test p-value**	0.000
A-Bond AR(1) Test	0.048	**Sargan Test**	0.113
A-Bond AR(2) Test	0.166		

Note: *, **, *** significant at 10%, 5%, 1% level respectively.

Source: Authors' estimation

Among internal bank-specific factors, deposit-related dynamics play a significant role in shaping bank stability. The DEP ratio is negatively and statistically significantly associated with stability, indicating that excessive reliance on deposit funding or instability in deposit structure can generate funding pressure and weaken resilience in a deposit-dominated banking system. Accordingly, H2, which hypothesizes that a higher deposit ratio reduces bank stability in Mongolia, is supported, highlighting the importance of prudent funding structure management.

The LR has a positive and statistically significant effect on bank stability, suggesting that banks with more active lending operations related to assets tend to be more stable. This relationship likely reflects improved income generation and more effective asset utilization, provided that credit risk is adequately controlled. Consistent with this evidence, H5, which posits that higher lending rates enhance bank stability, is supported, indicating that larger interest margins can support stability when accompanied by sound risk management practices.

Credit risk emerges as the most critical source of instability, underscoring the importance of effective loan screening, monitoring, and resolution mechanisms. The NPL exhibits a negative and highly significant effect on bank stability, confirming that deteriorating asset quality erodes profitability, weakens balance sheets, and increases vulnerability to adverse shocks. This finding provides strong empirical support for H6, which posits that higher credit risk undermines bank soundness.

Operational efficiency, measured by the ratio of EFF, is significantly and negatively associated with instability, implying that more efficient banks are better able to absorb

shocks and manage risks. However, despite the statistical significance of the efficiency coefficient, the hypothesis that greater efficiency unequivocally enhances bank stability (H7) is not accepted, suggesting that operational efficiency alone does not guarantee stability and may be offset by other risk-taking behaviors or structural constraints.

Macroeconomic conditions significantly influence bank stability in Mongolia. GDP growth is negatively associated with stability, indicating that periods of rapid economic expansion may coincide with increased risk-taking, credit booms, or a relaxation of lending standards, thereby weakening financial soundness. In contrast, inflation has a positive and statistically significant effect, suggesting that moderate inflation may support bank stability by improving nominal returns, easing real debt burdens, and strengthening bank earnings in the short run. These findings highlight the sensitivity of bank stability to macroeconomic fluctuations and underscore the close linkage between financial soundness and the broader economic environment. As a result, H8 & H9, which hypothesize a positive effect of economic growth, and a negative effect of inflation on stability, are not supported.

Standard post-estimation diagnostics confirm the validity of the system GMM specification. The Arellano–Bond tests indicate significant first-order serial correlation in the differenced residuals, as expected in dynamic panel models. In contrast, the absence of second-order serial correlation supports the validity of the instrument lag structure. Instrument validity is further corroborated by the Hansen and difference-in-Hansen tests, which fail to reject the null hypothesis of instrument exogeneity. Together, these diagnostics indicate that the instrument set is appropriate and that the system GMM estimates are consistent.

Overall, the estimation results support the use of a dynamic panel GMM framework and provide robust empirical evidence that strengthening internal risk management, maintaining a sound funding structure, supporting productive yet prudent lending, and ensuring macroeconomic stability are essential to enhancing the resilience of commercial banks in Mongolia.

Conclusion

Building on the system GMM estimates, the results indicate that bank stability in Mongolia is driven primarily by contemporaneous internal fundamentals rather than strong dynamic persistence. The lagged dependent variable is not statistically significant, implying rapid adjustment in bank stability in response to current conditions. This finding suggests that managerial decisions and prevailing macroeconomic conditions outweigh historical stability effects, consistent with a banking system characterized by active balance-sheet management and effective regulatory oversight.

Among internal bank-specific factors, deposit-related dynamics play a significant role in shaping bank stability. DEP is negatively and statistically significantly associated with

stability, indicating that excessive reliance on deposit funding or instability in deposit structure can generate funding pressure and weaken resilience in a deposit dominated banking system. Credit risk emerges as the most critical source of instability. NPL exhibits a negative and highly significant effect on bank stability, confirming that deteriorating asset quality erodes profitability, weakens balance sheets, and increases vulnerability to adverse shocks. LR has a positive and statistically significant effect on bank stability, suggesting that banks with more active lending operations related to assets tend to be more stable. This relationship likely reflects improved income generation and more effective asset utilization, provided that credit risk is adequately controlled. Operational efficiency, measured by the ratio of EFF, is negatively and significantly associated with instability, implying that more efficient banks are better able to absorb shocks and manage risks. This suggests that operational efficiency alone does not guarantee stability and may be offset by other risk-taking behaviors or structural constraints.

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In conclusion, the estimation results validate the use of a dynamic panel GMM framework and provide robust empirical evidence that strengthening internal risk management, maintaining a sound funding structure, supporting productive but prudent lending, and ensuring macroeconomic stability are essential for enhancing the resilience of commercial banks in Mongolia.

Policy Implications

The findings of this study yield several important policy implications for bank managers, regulators, and policymakers in Mongolia.

First, the strong and robust negative impact of credit risk on bank stability highlights the need to strengthen credit risk management frameworks. The significant effect of non-performing loans underscores the importance of rigorous loan underwriting standards, continuous monitoring, and effective resolution mechanisms. From a regulatory perspective, closer supervision of asset quality, early identification of problem loans, and timely corrective interventions are essential to prevent the accumulation of credit risk and safeguard system-wide stability.

Second, the negative effect of deposit reliance on bank stability emphasizes the importance of prudent funding structure management in a deposit-dominated banking system. Excessive dependence on deposit funding or volatile deposit growth can heighten liquidity and rollover risks. Banks should therefore adopt balanced funding strategies, while supervisory authorities may strengthen oversight of funding concentration, maturity mismatches, and liquidity buffers to mitigate potential vulnerabilities arising from funding pressures.

Third, the positive contribution of lending activity to bank stability, when accompanied by effective risk management, suggests that productive financial intermediation can reinforce resilience. The empirical results indicate that higher lending rates and active loan allocation improve income generation and asset utilization, provided that credit risk remains contained. Accordingly, policy frameworks should encourage prudent lending practices that prioritize credit quality and sustainability rather than credit expansion alone.

Fourth, although operational efficiency is significantly associated with stability, the results suggest that efficiency alone does not guarantee financial soundness. This finding highlights the importance of managerial quality, sound governance, and effective cost control as complementary factors in enhancing bank resilience. Policies that promote transparency, competition, digital transformation, and improvements in corporate governance can strengthen operational performance and strengthen banks' capacity to absorb shocks.

Finally, the significant influence of macroeconomic conditions on bank stability indicates that macroeconomic stability is a necessary precondition for financial stability in Mongolia. The adverse effect of rapid economic expansion and the supportive role of moderate inflation underscore the importance of maintaining sustainable growth and price stability. Close coordination between monetary policy, macroprudential regulation, and bank supervision is therefore essential, particularly during periods of economic volatility. Moreover, given the limited persistence of bank stability identified in the analysis, timely and forward-looking supervisory actions, such as stress testing and early-warning systems, are critical, as delayed interventions may be less effective once vulnerabilities materialize into systemic risks.

References

Al-Homaidi, E. A., Tabash, M. I., Farhan, N. H., & Almaqtari, F. A. (2019). The determinants of liquidity of Indian listed commercial banks: A panel data approach. Cogent Economics & Finance, 7(1), 1616521.

Arellano, M., & Bond, S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. The Review of Economic Studies, 58(2), 277.

Athari, S. A., Irani, F., & AlAl Hadood, A. (2023). Country risk factors and banking sector stability: Do countries' income and risk-level matter? Evidence from global study. Heliyon, 9(10), e20398.

Basel Committee on Banking Supervision. (2010). Basel III: A global regulatory framework for more resilient banks and banking systems. Bank for International Settlements.

Berger, A. N., & DeYoung, R. (1997). Problem loans and cost efficiency in commercial banks. Journal of Banking & Finance, 21(6), 849–870.

Birhan, T. A., & Kaur, J. (2025). Bank Risk-taking in the Ethiopian Banking Sector: The Influence of Bank-specific Factors. Global Business Review, 09721509241310036.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics, 87(1), 115–143.

El Moussawi, C., & Mansour, R. (2022). Competition, cost efficiency and stability of banks in the MENA region. The Quarterly Review of Economics and Finance, 84, 143–170.

Garcia, M. T. M., & Abreu, S. R. (2024). Banking stability determinants: Evidence from Portugal. Journal of Banking Regulation, 25(2), 160–178.

Hajdini, A., & Hoti, A. (2025). Bank stability in the Eurozone: A comprehensive analysis of key determinants (2006–2021). Journal of Economic Studies.

Nier, E. W. (2009). Financial stability frameworks and the role of central banks: Lessons from the crisis (IMF Working Paper No. WP/09/70). International Monetary Fund.

Ozili, P. K. (2025). Reflecting on the Recent Banking Crisis, What Are the New Financial Stability Determinants? Economic Notes, 54(2), e70014.

Pham, T. T., Dao, L. K. O., & Nguyen, V. C. (2021). The determinants of bank's stability: A system GMM panel analysis. Cogent Business & Management, 8(1), 1963390.

Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. Stata Journal, 9(1), 86–136.

Sang Tang My. (2020). Credit Risk and Bank Stability of Vietnam Commercial Bank: A BK Approach. International Journal of Analysis and Applications.

Tariq, W., Usman, M., Tariq, A., Rashid, R., Yin, J., Memon, M. A., & Ashfaq, M. (2021). Bank maturity, income diversification, and bank stability. Journal of Business Economics and Management, 22(6), 1492–1511.

Yitayaw, M. K., Mogess, Y. K., Feyisa, H. L., Mamo, W. B., & Abdulahi, S. M. (2023). Determinants of bank stability in Ethiopia: A two-step system GMM estimation. Cogent Economics & Finance, 11(1), 2161771.

Appendix 1. List of commercial banks, times observed and links to the bank websites.

	Name of the bank	**Start**	**Number of years**	**Links**
1	Khan Bank	2014-2024	11	Khanbank
2	Trade and Development Bank of Mongolia	2014-2024	11	TDBM
3	Golomt Bank	2014-2024	11	Golomt bank
4	XacBank	2014-2024	11	Khas bank | Investors
5	State Bank	2014-2024	11	State bank
6	Capitron Bank	2014-2024	11	Capitron bank
7	Arig Bank	2014-2024	11	Arig bank
8	Trans Bank	2017-2024	8	Trans bank
9	Bogd Bank	2016-2024	9	Bogd Bank | Investors
10	M Bank*	2022-2024	3	M bank
11	Chinggis Khaan Bank	-	no data	-
12	National Investment Bank	-	no data	-
	Total number of observations		93	

*Removed from the dataset due to a few years of observation.

Source: Authors' compilation