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Bank Stability and Market Concentration: A Strategic Balance or an Inherent Risk in Indonesia?

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This study aims to examine the impact of market concentration, internal bank characteristics, and selected macroeconomic variables on the stability of Indonesia's banking sector from 2015 to 2022, with a focus on the concentration-fragility and concentration-stability hypotheses. The research employs a sample of 47 commercial banks, including both conventional and Islamic banks, and uses the System Generalized Method of Moments (Sys-GMM) for empirical analysis. The results support the concentration-fragility hypothesis, indicating that increased market concentration negatively affects financial stability. Additionally, the study finds that lagged bank stability, profitability (ROA), capital adequacy (ETA), and operational efficiency (CIR) significantly contribute to current stability, while high Non-Performing Loans (NPLs) positively impact stability when risk management practices are effective. The findings are based on data from 2015 to 2022 and may not fully capture the long-term effects of market concentration on bank stability. Future studies should explore other emerging factors affecting banking stability. The study provides valuable insights for policymakers by emphasising the importance of regulatory frameworks that foster competition and strengthen internal controls to mitigate systemic risks.

Keywords: Financial Stability; Market Concentration; Dual Banking System; System-GMM; Indonesian Banking Sector

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INTRODUCTION

The financial sector plays a fundamental role in the economy, with banks serving a crucial function by offering necessary financial resources to businesses and other economic activities (Pasaribu and Mindosa, 2021). Due to its crucial role, the banking sector has a substantial impact on the economic growth and stability of a nation (Smolo, 2022). Yet, the vulnerability to systemic threats makes it necessary for strict regulatory frameworks to be implemented worldwide (Asutay *et al.,* 2020). The sector's vulnerabilities were highlighted by the global financial crisis, leading to numerous bank failures and negative effects on the real economy (Ghenimi *et al.,* 2021). As a result, researchers have been placing more emphasis on examining the consequences of financial instability and its impact on the overall economy (Olmo *et al.,* 2021). In economies with market imperfections, it is crucial to protect depositors from the threat of bank failures. Financial instability results in widespread effects such as diminishing trust in financial institutions, hindering economic progress, and incurring high costs for recovery after a crisis (Pham *et al.,* 2021). Hence, it is crucial to pinpoint the underlying reasons for instability in the banking industry, especially given the various financial risks that banks face, such as liquidity, credit, interest rate, and operational risks (Igan *et al.,* 2023).

In Indonesia, the banking industry has significant power over the nation's financial system, which is why keeping it stable is a top priority for regulators. The banking industry's essential role in the economy was highlighted by the banking crises of 1997 and 2009, showcasing how problems in this sector can have widespread effects on the overall economy (Maulana *et al.,* 2020). Indonesia's regulatory oversight is made more complex by the presence of both conventional and Islamic banks in its dual banking system, requiring specific measures to maintain stability in the sector (Rusydiana et al., 2019). The ever-changing market concentration adds to the complexity of this challenge. The number of participants in the market is important in influencing the competitive environment within the banking sector, as stated by Khan *et al.,* (2016). Increased number of participants enhances competition, while decreased players diminish it. The level of competition in the banking sector directly influences financial stability (Louhichi *et al,* 2019).

From 2011 to 2021, there was a significant rise in market concentration within Indonesia's banking sector. The steady increase in market share of the biggest banks indicates potential trends like mergers, acquisitions, or the dominance of major banks that may impact competition levels in the industry. The growing level of concentration might require adjustments in regulatory measures to ensure the maintenance of a competitive environment, as heightened concentration can impact the overall stability of the industry.

There are two main viewpoints on the connection between concentration and stability in banking: the "concentration-stability" hypothesis and the "concentration-fragility" hypothesis. Keeley (1990) suggested that competitive markets decrease bank profitability and stability, supporting the "concentration-stability" or "competition-fragility" hypothesis. On the other hand, according to the "concentration-fragility" or "competition-stability" theory, increased competition pushes banks to provide better loan rates, which in turn lowers default risks for borrowers and improves the overall stability of the banking industry (Boyd *et al.,* 2006).

Empirical evidence supports both viewpoints. Research by Nguyen (2023), Tran *et al.,* (2022), Nyangu *et al.,* (2022), Calice and Leonida (2018), Kabir and Worthington (2017) found that increasing competition led to a decrease in bank stability. Therefore, the concept of "concentration-stability" has been confirmed. On the contrary, the remaining results backed the idea of "concentration-fragility." The studies conducted by Risfandy et al., (2022), Cuestas *et al.,* (2020), Phan *et al.,* (2019), Saif-alyousfi *et al.,* (2019), Kasman and Carvallo (2014) found that increased concentration had a negative effect on the stability of banks. Calice *et al.,* (2021) provide a more detailed viewpoint, contending that the connection between concentration and stability is not linear. Their results indicate that concentrations lower than 50% promote stability, while concentrations higher than 65% have a destabilizing impact.

With the recent rise in market concentration in Indonesia's banking industry, it is crucial to determine if this trend will improve or weaken the stability of banks. Understanding these dynamics will contribute to resolving the research gap on the two conflicting theories in the Indonesian banking industry. Moreover, the limited research on the link between competition and stability in Indonesia emphasizes the significance of this study, for both academic purposes and regulatory policy development. The results of this study could be used by banks as a strategic tool to enhance operational efficiency and may be cited in upcoming

research on the interaction between competition and stability in Indonesia's banking industry.

LITERATURE REVIEW

Bank stability refers to the ability of a bank or the banking industry to withstand economic shocks and unfavourable conditions without facing major financial difficulty or collapse (Allen and Wood, 2006). A reliable banking system is crucial for economic development as it ensures the smooth operation of financial intermediation, including lending, payment processing, and capital allocation, especially during periods of economic instability (Wiyarni *et al.,* 2022). Assessing bank stability is a complex concept that cannot be accurately determined with just one measure. According to Goodhart and Segoviano (2009), a thorough assessment of bank stability involves conducting multiple sensitivity checks with different indicators. This method recognizes the intricate nature of banking activities and the various factors that impact stability. Of all these factors, the link between monetary and financial stability is especially crucial. Both types of stability are connected, with problems in one area leading to negative effects in the other, ultimately impacting economic growth. Maintaining a strong banking system and fostering continued economic growth require the assurance of financial and monetary stability. Wiyarni *et al.,* (2022) state that banking stability is commonly assessed using risk evaluation: the Z-Score index and the Non-Performing Loan (NPL) ratio. However, the stability of the banking sector is not solely determined by these internal metrics; it is also heavily influenced by the structure and dynamics of the market in which banks operate, particularly in terms of market concentration and competition (Malini and Putri, 2020).

Market concentration within the banking industry relates to the level at which a few banks control the market in assets, deposits, or lending (Ben Ali *et al.,* 2018). Metrics like the Herfindahl-Hirschman Index (HHI) or concentration ratios, such as CR4, are commonly used to measure the level of concentration in a market (Owen and Pereira, 2018; Nyangu *et al.*, 2022). High market concentration means that a small number of big banks have a substantial influence over the market, which can impact bank stability positively or negatively. The ongoing discussion among economists and policymakers revolves around the connection between market concentration and bank stability (Kabir and Worthington, 2017). There are two main theories that have been developed in this discussion: the Concentration-Stability Hypothesis (CSH) and the Concentration-Fragility Hypothesis (CFH).

The Concentration-Stability Hypothesis (CSH) suggests that increased market concentration results in enhanced stability within the banking industry. Proponents of this viewpoint posit that robust, well-capitalized banks, which are prevalent in competitive markets, are more adept at weathering economic instability due to their ability to diversify risks, capitalize on economies of scale, and uphold substantial capital reserves (Tran *et al.,* 2022). These banks are frequently more prepared to handle losses and maintain functions during financial strain, decreasing the risk of bank failures that could disrupt the whole financial system (Keeley, 1990). Moreover, in a market with high concentration, regulators can concentrate their attention on fewer large institutions, potentially improving supervision and decreasing the likelihood of systemic crises (Allen and Gale, 2004)

In the past, the CSH has received support from nations with centralized banking systems, wherein prominent banks assisted in stabilizing the economy during times of financial turmoil. Amid the 2008 global financial crisis, countries such as Canada and Australia, characterized by a small number of well-capitalized banks, encountered less acute banking sector distress in comparison to countries with less consolidated banking systems (Ratnovski and Huang, 2009). This argument is reinforced by the observation that larger banks have the ability to access capital markets, foster customer trust, and receive indirect government support as a result of being deemed "too big to fail," demonstrating that market concentration can bolster bank stability.

On the other hand, the Concentration-Fragility Hypothesis (CFH) argues that increased market concentration could escalate systemic risk and financial instability. This point of view suggests that big banks in competitive markets might take on more risk due to the moral hazards linked to their "too-big-to-fail" position (Calice *et al.,* 2021). The belief that these banks will be rescued by the government during crises can result in increased risk-taking, inadequate risk management, and ultimately, heightened susceptibility to financial shocks (Boyd and De Nicoló, 2005). The CFH points out that if a major, powerful bank in a market with few competitors collapses, it can cause serious damage to the whole financial system, leading to widespread contagion and economic turmoil.

Empirical evidence backing the CFH emerged during the 2008 financial crisis, as major banking

markets in the US and UK faced significant financial upheaval. The close relationship between major banks, along with their substantial investment in risky assets, played a role in the swift transmission of financial problems throughout the worldwide banking sector (Beck *et al.,* 2006). This incident highlighted the vulnerability of centralized banking markets, where the collapse of one institution can cause widespread effects.

Experts acknowledge the intricate connection between regulations, competition, and industry traits in the ongoing evolution of the debate surrounding market concentration and bank stability. Moderate concentration can increase the stability of banks, while excessive concentration can elevate systemic risks. The competition encourages innovation and can also result in risky behaviors if not properly controlled (Vives, 2016). Regulatory structures are crucial in managing these impacts. Regulation that is well-implemented, such as capital requirements and risk management, aids in reducing risks associated with concentration and competition (Li, 2019). In Indonesia, the banking industry demonstrates a combination of consolidation, with a few major banks, and competition, particularly from smaller banks and specialized financial institutions (Sahul Hamid, 2017).

Prior research on the correlation between market concentration and bank stability employed diverse approaches and produced mixed findings. Nguyen (2023) conducted a study on Southeast Asian banks, using panel data to examine the Herfindahl-Hirschman Index (HHI) and Z-Score. The results indicated that reduced bank stability was linked to higher competition, as shown by a lower HHI, supporting the "Concentration-Stability" theory. Tran *et al.,* (2022) discovered that decreased market concentration resulted in increased risks for Vietnamese banks based on indicators such as ROA, NPLs, and CARs. Similarly, Calice & Leonida (2018) studied European banks and discovered that a moderate level of concentration improved stability, while too much concentration had a negative impact, indicating a nonlinear correlation. Kabir and Worthington (2017) noted that in Australia, there was a positive relationship between high market concentration and bank stability, highlighting the significance of regulation in concentrated markets.

In contrast, Risfandy *et al.,* (2022) in Indonesia and Cuestas *et al.,* (2020) in Latin America discovered that a greater market concentration, as shown by a higher HHI, led to more instability and risky lending practices, backing up the "Concentration-Fragility" concept. Nyangu *et al.,* (2022) discovered in African nations that excessive concentration led to decreased bank stability, highlighting the importance of fair competition in preserving stability.

Several research studies in Indonesia have concentrated on market concentration and competition in the banking industry. Wibowo and Wibowo (2019) investigated how market structure in Indonesia affects bank performance by employing stochastic frontier analysis (SFA) to evaluate efficiency and stability. The research indicated that increased market concentration, as determined by the HHI, led to decreased efficiency and increased instability, backing the "Concentration-Fragility" theory. Soedarmono *et al.,* (2012) examined the competitive dynamics within Indonesia's dual banking system by utilizing a Panzar-Rosse model to gauge the level of competition. Their research indicated that heightened competition, especially in the Islamic banking industry, led to decreased bank stability as a result of bold risk-taking actions. However, the study by Santoso *et al.,* (2023) shows that higher concentration within the Islamic banking sector in Indonesia generally leads to greater stability. The study reveals that as market concentration increases, with fewer but larger Islamic banks dominating the market, these banks tend to be more stable, aligning with the "Concentration-Stability" hypothesis.

In spite of these contributions, there remains a significant lack of knowledge regarding the impact of market concentration on the stability of banks in Indonesia's dual banking system, especially considering the distinctive regulatory and competitive landscape. This study intends to fill this void by examining the correlation between market concentration and bank stability in Indonesia, utilizing data from 2015 to 2022. This study provides a thorough analysis of stability in both conventional and Islamic banks by looking at internal factors like bank-specific financial ratios and external factors. This study's uniqueness comes from utilizing up-to-date information and examining a dual banking system, offering fresh perspectives on how market concentration affects bank stability within a complicated regulatory setting.

RESEARCH METHODOLOGY

Data

This study used a quantitative approach to investigate the relationship between variables, assess the level of concentration, and evaluate the impact of concentration on the stability of banks in Indonesia.

The estimation also included banks' specific characteristics, such as profitability (ROA), asset quality (NPF), Efficiency (cost to income ratio/CIR), capitalization (equity to total asset/ETA), liquidity ration (LR), and bank size (Ln total asset). Moreover, the models were extended by including macro-factors as control variables using GDP growth, inflation, and dummy Covid-19 period. The study period ranged from 2015 to 2022, reflecting the significant growth in concentration in Indonesia's banking sector reported by the World Bank since 2015. Additionally, accumulating more data can lead to improved statistical results (Li, 2019). Purposive sampling was used to select participants. The sample consisted of 33 Conventional Commercial Banks and 14 Islamic Commercial Banks. The information was gathered from Indonesian Banking Statistics Data released by Bank Indonesia, providing a comprehensive macro-level evaluation of the variables under study. Furthermore, data from the Financial Services Authority's banking publication and Statistics Indonesia were also utilized. All utilized data were in the form of secondary data obtained from the official website of each institution.

The dependent variable in this study is bank stability. According to Beck (2008), the stability of banks refers to their ability to efficiently perform their intermediary roles, which include the collection and allocation of public monies, as well as the provision of financial services in a normal and efficient manner. Bank stability is commonly assessed using the Z-score metric, as indicated in the relevant scholarly literature (Olgić Draženović and Buterin, 2022; Yitayaw *et al.*, 2023). According to Boyd and Nicolo (2005), banks with a negative Z-score are deemed to be in a state of bankruptcy, while those with a Z-score close to zero are characterised by an inherent instability. Conversely, banks with a Z-score significantly greater than zero exhibit a favourable level of stability. Hence, as the Z-score value increases beyond zero, the stability of the bank also increases, and this relationship is read in an inverted manner.

$$Zscore_{it} = \frac{ROA_{it}+ETA_{it}}{\sigma ROA_{it}} \quad (1)$$

where ROA_{it} denotes return on assets at the bank *i* and time *t*; ETA_{it} denotes equity-to-asset ratio at the bank i and time t; ROA_{it}, which stands for the sample's standard deviation; $Z\text{-score}_{it}$, a measure of a bank's stability. The model includes multiple explanatory factors. The variables are defined in Table 1.

Table 1 Definition of Variables

Variables	Proxy	Description	Sources
Independent Variable			
Bank Concentration	Herfindahl–Hirschman index (HHI)	A country-level indicator that measures the amount of competition in the banking industry	Saif-Alyousfi & Saha (2021);
Bank-Specific Variable (Internal Factor)			
Profitability	ROA	Net profits over average total assets (%)	Muizzuddin et al., (2021);
Credit Risk	NPL/NPF	NPL/NPF to total loans (%)	Moudud-Ul-Huq et al., (2023);
Efficiency	CIR	Total expenses over total generated revenues (%)	Naili & Lahrichi (2020)
Capitalization	ETA	Equity/total assets (%)	Maria Antony & G., (2023)
Liquidity Ratio	LR	Liquid Assets/Total Customer Deposit Average (%)	Yitayaw et al., (2023)
Bank Size	Ln Total Asset	Natural log of total assets	Abbas & Ali (2022)
Macroeconomics Variable (External Factor)			
GDP	GDP Growth	Annual GDP growth rate (%)	Mukhibad et al., (2023)
INF	Inflation	Consumer price index (%)	Khattak & Khan (2023)
Dummy Covid-19 Period	Dummy 1 and 0	1: the period of Covid; 0: otherwise.	

Methods

The Generalised Method of Moments (GMM) estimator proposed by Arellano & Bover (1995) is employed in this study. The GMM estimator is employed in the present study due to the limitations of

OLS and fixed effects methods in addressing various challenges associated with assessing the factors influencing bank stability. Furthermore, it is unable to tackle issues related to heterogeneity, endogeneity, profit and risk persistence, and autocorrelation. In addition, the GMM estimator effectively tackles the issue of the unit root property and yields more precise results (Saif-Alyousfi, 2019). According to Hall (2005), it is emphasised that the usage of Generalised Method of Moments (GMM) estimation is more efficient compared to two-stage least squares (2SLS) or three-stage least squares (3SLS) methods due to its ability to account for heteroskedasticity. Additionally, it should be noted that estimate methods that rely on ordinary least squares (OLS) principles are susceptible to bias caused by omitted variables (Saif-Alyousfi, 2019).

The estimator that is obtained as a result is commonly referred to as System GMM (GMM-sys). The system GMM estimator, as developed by Arellano and Bover (1995) and Blundell & Bond (1998), effectively addresses the bias inherent in typical panel models, such as pooled OLS and fixed-effect models. Furthermore, the utilization of system GMM estimation yields estimates that are both efficient and consistent, even in cases when the explanatory variables do not fully adhere to the assumption of exogeneity. Additionally, this method is robust against the presence of heteroskedasticity and autocorrelation within individuals.

Furthermore, the system generalized method of moments (GMM) approach resolves issues related to endogeneity and fixed effects, while also mitigating the presence of dynamic panel bias (Nickell, 1981). The issue of endogeneity is resolved by the utilization of instruments such as lagged-dependent variables and endogenous variables, together with their respective lags at different levels (e.g., lagged two). This methodology is commonly known as the first-difference generalized method of moments (GMM) approach. The GMM model's distinction is classified as one-step and two-step GMM estimators. However, it has been argued that the estimates of the difference GMM estimator may be biased and inconsistent due to the exclusion of potentially relevant information that could capture the relationship between levels and initial differences (Ahn and Schmidt, 1995).

The system-GMM estimation is considered to be more efficient compared to the difference GMM estimation due to its utilization of a system that incorporates regressions of both levels and first differences. According to Blundell & Bond (1998), the system-GMM estimator demonstrates greater efficiency in cases where the number of time periods is limited and there exists a strong correlation between the persistence in the dependent variable and the autoregressive term, which approaches unity.

Instrument reliability is crucial for accurate estimation in GMM. In order to confirm the accuracy of our GMM estimation, we carried out multiple specification tests. The tests consist of the Arellano-Bond AR(1) and AR(2) tests for detecting first and second-order autocorrelation in the residuals, along with the Sargan test for overidentifying restrictions. The tests for AR(1) and AR(2) assume no serial correlation of the residuals in the null hypothesis; we want to reject the null hypothesis for AR(1) but not for AR(2). It is anticipated to reject the null hypothesis in the AR(1) test due to the usual presence of first-order autocorrelation after differencing. In the Sargan test, we expect to not reject the null hypothesis, which assumes the validity of the instruments used.

Model Specification

Dynamic panel models are frequently employed in contemporary banking studies. Due to the characteristics of our dataset, we utilize this method to examine the correlation between the level of bank concentration and stability within the banking industry of Indonesia. The regression involves past bank stability, indicating consistency over time and connection between data points, similar to a random walk. Banking executives need to take into account regulatory changes that focus on decreasing risky behavior and how they affect both present and future risk management. The dynamic model assists banks in handling expenses related to complying with regulatory modifications (Mittal and Garg, 2021; Pham, Dao and Nguyen, 2021). The model utilized is expressed in the following form:

$$ZScore_{it} = \alpha_0 + \delta\, Zscore_{it-1} + \beta_1 HHI_{it} + \beta_2 ROA_{it} + \beta_3 CR_{it} + \beta_4 CIR_{it} + \beta_5 CAP_{it} + \beta_6 LR_{it} + \beta_7 SIZE_{it} + \beta_8 GDP_{it} + \beta_9 INF_{it} + \beta_9 DCovid19_{it} + u_{it} \quad (2)$$

Where: $ZScore_{it}$ is the stability of banks in bank i at time t, with i = 1, . . . , N and t = 1, . . . , T, α is the constant, where $Zscore_{it-1}$ is the one-year lagged bank stability, while δ is the adjustment speed to equilibrium, whose values indicate whether stability persist, but will return to their long-term level (δ is between 0 and 1), depending on whether the banking

sectors in Indonesia are more or less stable (δ closer to 0 or 1, respectively). β is the coefficient, HHI_{it} is Herfindahl–Hirschman index of banks in bank i at time t, ROA_{it} is Return on Asset of banks in bank i at time t, CR_{it} is Credit Risk of banks in bank i at time t, CIR_{it} is Cost to Income Ratio of banks in bank i at time t, CAP_{it} is capitalization of banks in bank i at time t, LR_{it} is liquidity ratio of banks in bank i at time t, $SIZE_{it}$ is bank size of banks in bank i at time t, GDP_{it} is GDP growth of banks in bank i at time t, INF_{it} is infaltion of banks in bank i at time t, and $DCovid19_{it}$ is dummy of covid19 period in bank i at time t

. $u_{it} = \mu_i + v_{it}$, where μ_i is the bank-specific constant term that captures unmeasured heterogeneity, and v_{it} is the error term.

RESULT AND ANALYSIS

Descriptive Statistics

The descriptive statistics provide a summary of key variables associated with the Z-score of the banking sector in Indonesia, based on 376 observations.

Table 2 Descriptive Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
Zscore	376	29.74296	25.10159	-1.857832	176.9199
HHI	376	0.106367	0.003813	0.098992	0.111363
ROA	376	1.207074	2.858486	-20.13	13.58
NPL	376	1.575459	1.333046	0	7.91
CIR	376	90.50233	31.5297	39.15	428.4
ETA	376	17.91327	11.05616	3.177513	100
LR	376	11.38346	43.06557	0	312.4968
SIZE	376	18.96341	2.879635	13.40289	26.44596
GDP	376	4.014862	2.34798	-2.065512	5.308595
INF	376	3.452152	1.386868	1.56013	6.363121
CRISIS	376	0.375	0.484768	0	1

The Z-score, which indicates financial stability, has an average of 29.74 and shows high variability, ranging from -1.86 to 176.92. The Herfindahl-Hirschman Index (HHI) indicates moderate market concentration, with a mean of 0.1064. Profitability, measured by ROA, has an average of 1.21 but varies widely, while the Non-Performing Loans (NPL) ratio has an average of 1.58, suggesting some variability in credit risk. The Cost-to-Income Ratio (CIR) averages 90.50, reflecting disparities in operational efficiency. The Equity to Total Assets (ETA) ratio averages 17.91, and the Liquidity Ratio (LR) exhibits significant variability, with a mean of 11.38 and a wide range. The average bank size (SIZE) is 18.96. Macroeconomic indicators such as GDP growth (mean 4.01) and inflation (mean 3.45) show moderate variability. Finally, the CRISIS variable, a binary indicator, suggests that 37.5% of the observations correspond to a crisis period. This provides a concise overview of the variability and central tendencies of the variables related to the stability of the banking sector.

Correlation Analysis

The correlation analysis indicates no variables are strongly interrelated, suggesting the data is free from multicollinearity. This means the variables can be analyzed independently without significant overlap, enhancing the reliability of the results related to the Z-score and other factors in the Indonesian banking industry.

The correlation analysis highlights important connections between the variables influencing the Z-score in the Indonesian banking sector. The Z-score shows a positive relationship with ROA (0.1509) and ETA (0.1046), indicating that increased profitability and capital adequacy slightly improve financial stability. On the other hand, it has a negative correlation with NPL (-0.2687) and CIR (-0.2270). This shows that increased credit risk and inefficiency reduce stability. HHI exhibits a significant positive connection with CRISIS (0.6873) as well as a negative correlation with INF (-0.7143) and GDP (-0.4866), associating increased market concentration with economic downturns and reduced inflation and economic expansion.

Table 3 Correlation Matrix

	Zscore	HHI	ROA	NPL	CIR	ETA	LR	SIZE	GDP	INF	CRISIS
Zscore	1.0000										
HHI	0.0351	1.0000									
ROA	0.1509	0.0924	1.0000								
NPL	-0.2687	-0.1760	-0.4719	1.0000							
CIR	-0.2270	-0.0544	-0.7203	0.2842	1.0000						
ETA	0.1046	0.1126	-0.0254	-0.1126	0.2431	1.0000					
LR	-0.0810	0.0089	0.1244	-0.1579	-0.0815	-0.0704	1.0000				
SIZE	-0.0234	0.0622	-0.0036	0.1921	-0.1141	-0.4031	-0.1362	1.0000			
GDP	0.0089	-0.4866	-0.0067	0.0506	0.0166	-0.0203	0.0043	-0.0166	1.0000		
INF	-0.0179	-0.7143	-0.0492	0.1143	-0.0038	-0.0624	-0.0140	-0.0419	0.5050	1.0000	
CRISIS	0.0274	0.6873	0.0193	-0.2198	0.0037	0.0916	0.0028	0.0642	-0.5614	-0.4970	1.0000

Profitable banks tend to have lower credit risk and better efficiency as ROA shows a negative correlation with NPL (-0.4719) and CIR (-0.7203). The relationship between CRISIS and GDP growth (-0.5614) and inflation (-0.4970) highlights the influence of economic factors on the banking sector's stability.

The Two-Step System GMM Results

Table 4 Two-Step System GMM Result

Variable	Coefficient	Std.Error	z	P > |z|
Lag1 Zscore	0.1028***	0.0119	8.59	0.000
HHI	-76.6742**	39.2162	-1.96	0.050
ROA	0.3739***	0.1107	3.38	0.001
NPL	1.1263***	0.2480	4.54	0.000
CIR	0.0807***	0.0114	7.07	0.000
ETA	1.5227***	0.0484	31.44	0.000
LR	-0.0485	0.0814	-0.60	0.551
SIZE	3.3074***	0.4457	7.42	0.000
GDP	-0.0249	0.0440	-0.57	0.570
INF	0.0723	0.0515	1.40	0.160
CRISIS	-0.2621	0.3059	-0.86	0.392
Cons	-63.8894***	7.4249	-8.61	0.000
No. Obs	329	No. of Inst	38	
No. of Banks	47	Min.	7	
Wald Chi2(11)	7712.55	Average	7	
Prob > Chi2	0.0000	Max.	7	
Arellano-Bond test for AR(1) in first differences		z = -1.0879, Prob > z = 0.2766		
Arellano-Bond test for AR(2) in first differences		z = 0.6841, Prob > z = 0.4939		
Sargan test of overidentifying restrictions		Chi2(26) = 27.6257, Prob > Chi2 = 0.3771		

** and *** denote 5% and 1%, respectively

Table 4 displays the two-step SYS-GMM estimates, revealing a significant positive coefficient of 0.1028 ($p < 0.01$) for the lagged Z-score, suggesting that past financial stability has a positive impact on present stability. The negative coefficient of -76.6742 ($p = 0.050$) in the Herfindahl-Hirschman Index (HHI) indicates that increased market concentration could potentially decrease financial stability.

The importance of profitability (ROA) in improving stability is underscored by a substantial positive coefficient of 0.3739 ($p < 0.01$). Surprisingly, Non-Performing Loans (NPL) show a significant coefficient of 1.1263 ($p < 0.01$), suggesting efficient risk management in banks that have higher NPLs. The stability of some banks is maintained despite operational inefficiencies by the Cost-to-Income Ratio

(CIR), with a coefficient of 0.0807 ($p < 0.01$) positively influencing stability. The significance of maintaining financial stability is highlighted by the Equity-to-Total Assets (ETA) ratio, which has a robust positive coefficient of 1.5227 ($p < 0.01$) and emphasizes the importance of capital adequacy. On the other hand, the Liquidity Ratio (LR) shows a non-significant negative coefficient of -0.0485 ($p = 0.551$), suggesting that it does not have a significant effect on stability. A larger bank size leads to increased stability, as indicated by a 3.3074 coefficient with a significance level of less than 0.01, possibly because of improved risk management skills.

The impact of GDP growth and inflation on stability is not significant, with GDP growth having a negative coefficient of -0.0249 ($p = 0.570$) and inflation having a positive coefficient of 0.0723 ($p = 0.160$). Finally, in this model, the CRISIS variable shows a non-significant negative coefficient of -0.2621 ($p = 0.392$), indicating that crises do not have a significant impact on the Z-score.

The Wald Chi2 statistic of 7712.55 ($p < 0.01$) confirms that the variables together explain a considerable amount of the variation in financial stability, showing a strong overall fit of the model. Furthermore, the diagnostic tests for the two-step GMM model indicate that the model's assumptions and results are robust. The Arellano-Bond test for first-order autocorrelation (AR(1)) shows a statistic of $z = -1.0879$ with a p-value of 0.2766, suggesting no significant first-order autocorrelation in the residuals, which is expected. The Arellano-Bond test for second-order autocorrelation (AR(2)) has a statistic of $z = 0.6841$ with a p-value of 0.4939, indicating no significant second-order autocorrelation, confirming the model's validity. Additionally, the Sargan test of overidentifying restrictions reports a Chi2 statistic of 27.6257 with a p-value of 0.3771, showing that the instruments used in the model are valid. These results confirm that the two-step GMM model is well-specified, with no significant autocorrelation issues and appropriate instrument use, supporting the reliability of the model's estimates.

Analysis

The findings indicate that the prior year's Z-score's significant value underscores the importance of a bank's financial well-being in forecasting present stability. This indicates that banks in Indonesia's banking sector are more stable in the long run if they have solid financial bases and efficient risk management. In times of economic instability, banks that follow careful practices are more prepared to deal with difficult situations (O'Connell, 2023). During the 2008 financial crisis, Indonesian banks that were well-prepared performed better than those that were not as prepared. This discovery is consistent with research showing that solid banks have less financial ups and downs, increasing confidence in both investors and depositors (Karim, Al-Habshi and Abduh, 2016). Having a steady approach to managing risks is essential for maintaining resilience (Abuzayed *et al.,* 2018).

The analysis highlights the significant impact of market concentration, as measured by the Herfindahl-Hirschman Index (HHI), on the stability of Indonesia's banking sector. Findings indicate that higher market concentration negatively affects financial stability, making the system more vulnerable to systemic risks due to the dominance of a few large bank (Ben Ali *et al.,* 2018). This supports the concentration-fragility hypothesis, which suggests that reduced competition in concentrated markets increases systemic risk and instability (Saif-alyousfi *et al.,* 2018; Risfandy et al., 2020). This is especially important in Indonesia's dual banking system, as high levels of concentration could result in situations where banks are considered "too big to fail," promoting irresponsible risk-taking due to the anticipation of backing from the government. The absence of competition reduces motivation for banks to improve risk management and keep adequate capital reserves (Phan *et al.*, 2019). A study conducted by Cuestas *et al.,* (2020) suggests that enhanced competition may enhance stability through the rise of capital and supervision. In less cutthroat environments, a small number of leading banks might overlook risk control and creativity.

The research highlights how internal factors within banks impact the financial stability of Indonesia's banking industry. Profitability, as gauged by Return on Assets (ROA), is crucial for resilience, allowing banks to withstand losses in times of economic slowdowns, in line with prior studies on the importance of profitability in financial stability (Nyangu *et al.*, 2022). The analysis interestingly disputes the idea that high levels of Non-Performing Loans (NPLs) always negatively impact stability, demonstrating that banks can uphold stability by managing risks effectively, even with high NPL levels (Maria Antony and G., 2023; Danişman, 2018). Furthermore, stability is influenced by operational efficiency measures such as the Cost-to-Income Ratio (CIR), implying that a mix of income sources or outside assistance can help address

performance challenges. According to Abbas et al., (2022), the Equity-to-Total Assets (ETA) ratio emphasizes the importance of capital adequacy in ensuring stability, as banks with solid capital reserves are better equipped to withstand economic downturns. This coincides with previous research highlighting the significance of capital in ensuring stability (Thakor, 2014; Kharabsheh and Gharaibeh, 2022). Additionally, bigger banks are typically more secure because of their improved ability to manage risks and their access to resources, which boosts their ability to withstand financial crises (Ibrahim and Rizvi, 2017).

However, the research found that economic factors such as GDP growth and inflation do not have a straightforward or significant influence on banking stability. This suggests that their effects could be more complex or indirect. The research findings suggest that banks may have put in place strategies to minimize the impact of economic crises, as the crises did not have a substantial effect on stability in this specific model. This could illustrate the effectiveness of risk management practices or the influence of regulatory measures in challenging economic conditions.

Recent discoveries highlight the crucial importance of regulatory measures in improving financial stability and tackling fundamental problems. Chattha *et al.,* (2020) assert that regulators influence the banking environment and guarantee compliance with best practices. To enhance the banking sector's ability to withstand challenges, regulators should concentrate on various areas. Initially, it is crucial to uphold solid capital positions for financial stability, offering defense against possible losses (Phan *et al.,* 2021). Authorities need to put in place strict monitoring and regulations to guarantee that banks have sufficient capital, particularly in times of economic decline. Regulators can help banks prepare for unexpected events by implementing capital requirements and performing routine stress tests (Abbas *et al.,* 2022). Furthermore, it is crucial to focus on market concentration in order to reduce systemic risk (Ibrahim *et al.,* 2019). Diminished competition is a negative consequence of heightened focus, impacting financial stability. Regulators need to oversee market concentration and promote competition by implementing policies that make it easier for new companies to enter and lower obstacles. This will aid in reducing risks posed by major competitors and improving industry stability (Alam *et al.,* 2019). Ultimately, ensuring proper credit risk management is essential for maintaining stability, especially in relation to Non-Performing Loans (NPLs) (Saif-Alyousfi and Saha, 2021). The study suggests that banks can ensure stability even with elevated NPLs by implementing effective risk management techniques. Regulators need to support banks in managing credit risk effectively by offering assistance, such as training and resources, to navigate economic difficulties in handling loan portfolios.

While this research provides valuable insights into the factors affecting Indonesia's banking stability, it has limitations that suggest areas for further study. One limitation is the reliance on quantitative assessments, which may overlook the nuanced impacts of qualitative factors like management strategies and regulatory changes. Additionally, focusing on a single point in time may miss the evolving nature of financial stability. Future research should adopt a long-term perspective to track stability and market dynamics over time. Incorporating qualitative analyses and case studies could enhance understanding of how internal and external factors interact to influence financial stability. Exploring the effects of emerging trends, such as digital banking and fintech advancements, within Indonesia's dual banking system could further clarify the changing risk landscape. Addressing these aspects could strengthen research on financial stability and yield more targeted recommendations for policymakers and regulators.

CONCLUSION

This research provides a thorough examination of the determinants that impact the stability of Indonesia's banking industry, specifically looking at market concentration and internal bank attributes. Applying the Generalized Method of Moments (GMM) estimation technique. The study's data set consists of 33 Conventional Commercial Banks and 14 Islamic Commercial Banks, covering the timeframe between 2015 and 2022.

The findings from the System-GMM estimator expose several important perspectives. Previous financial health, demonstrated by the lagged Z-score, significantly influences current stability, underlining the significance of effective risk management and financial well-being over a period of time. The findings from the Herfindahl-Hirschman Index (HHI) suggest that higher market concentration has a detrimental impact on financial stability, providing evidence for the concentration-fragility theory. This indicates that increased market concentration, in which a small number of big banks have control, may worsen systemic risks. The research also shows that the

stability of banks is significantly influenced by profitability (ROA), capital adequacy (ETA), and operational efficiency (CIR), highlighting the importance of these internal factors. It is unexpected, but high Non-Performing Loans (NPLs) can actually indicate stability if effective risk management is in place, which goes against traditional beliefs. Nevertheless, stability does not seem to be significantly affected by economic variables like GDP growth, inflation, and crisis periods, indicating that their influences could be more subtle or indirect.

Recommendation

According to the results, a number of important suggestions arise for improving the stability of Indonesia's banking industry. Firstly, regulators need to focus on enhancing capital adequacy requirements to guarantee that banks uphold strong capital buffers. This will assist in offsetting possible losses and maintaining stability, especially in times of economic decline. Furthermore, it is essential to tackle market concentration. Regulatory measures should aim to enhance competition by supporting new players in the market, lowering barriers to entry, and limiting excessive consolidation within major banks. This strategy will reduce systemic risks linked to high concentration and foster a stronger banking system. Moreover, improving credit risk management is crucial. Regulators are encouraged to give advice on the most effective methods and offer support and education to aid banks in efficiently handling Non-Performing Loans (NPLs). Although operational efficiency is crucial, it must be balanced with robust capital adequacy and profitability in order to maintain stability.

Future research should explore emerging trends such as digital banking and fintech advancements, incorporate qualitative analyses, and consider long-term dynamics to provide a more comprehensive understanding of financial stability in the evolving banking landscape. This will enhance comprehension of the changing risk environment and help develop specific regulatory actions. By applying these suggestions, authorities can enhance the stability and resilience of Indonesia's banking industry.

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