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Article

Competition, economic freedom and bank stability: Evidence from ASEAN

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Abstract: This study examines how economic freedom and competition affect bank stability. We use data from 70 ASEAN-4 banks from 2007 to 2019 using the system generalized technique of moments. Results corroborate competition-fragility hypothesis. Market strength (or less competition) can boost bank stability. However, in the ASEAN-4 area, competition and bank stability have a non-linear relationship, suggesting that bank stability may decline after market strength exceeds a threshold. Financial and economic freedom also boosts bank stability. This implies banks in free financial and economic contexts are more stable. Banks with more market dominance in nations with more economic or financial autonomy may also be more unstable. The findings suggest that authorities should allow some competition and economic flexibility to keep banks stable. The study examined ASEAN-4 economic freedom's effects empirically for the first time. It illuminates competitiveness and bank stability.

Keywords: ASEAN-4; bank stability; competition; economic freedom

1. Introduction

There is a general consensus that a robust banking system is essential for the economic development and advancement of a country. The push for increased competition within the banking sector was a key driver of global changes in the 1980s and 1990s (Delis, 2012). However, it is important to recognize that the belief in the universal benefits of competition might be overly simplistic (Claessens and Laeven, 2004). Despite numerous studies, scholars have yet to reach a consensus on the effect of competition on banking stability. The literature presents two opposing views. According to Keeley (1990), the competition-fragility or competition-instability hypothesis suggests that increased competition in the banking sector can undermine a bank's market position, reduce profit margins, and devalue franchise value, thereby encouraging higher risk-taking behaviors. Conversely, Boyd and De Nicolo's (2005) research supports the competition-stability hypothesis, arguing that competition enhances the stability of banks. Thus, examining the impact of competition on banking stability is crucial (Beck et al, 2013; Schaeck and Cihák, 2014). Recent financial turmoil in Europe and the Global Financial Crisis of 2007/2008 have reignited debates over regulation and freedoms in the banking industry. Chortareas et al. (2013) suggest that deregulating financial markets could lead to increased risk-taking, potentially exacerbating financial crises in Europe and globally. Research examining the relationship between economic freedom and bank performance is relatively limited. Typically, economic freedom is used as a control or instrumental variable in studies assessing bank performance, as highlighted by Chortareas et al. (2013). Boyd and De Nicolo's (2005) theoretical assumptions have recently been scrutinized by Martinez-Miera and Repullo (2010), who argue that heightened competition among banks leads to reduced lending rates and subsequently lower interest income from promptly repaid

loans. They suggest that there is often a U-shaped relationship between competition and the likelihood of bank failure. However, only a limited number of studies have investigated this relationship.

Furthermore, the bulk of the research on the stability and competitiveness of banks has primarily concentrated on developed nations. Other studies have focused on specific regions that mirror our areas of interest under similar conditions. For example, Kouki and Al-Nasser (2017) conducted research specifically targeting Africa. While Ariss (2010) and Amidu and Wolfe (2013) have conducted research on emerging and developing economies, they typically did not address how economic freedom might affect the dynamics between competition and bank stability. While earlier works by Mavrakana and Psillaki (2019), Asteriou et al. (2016), have investigated the connections between economic freedom, risk-taking, and bank stability, this study takes a different approach. We concentrate on how economic freedom affects the link between competitiveness and the stability of banks.

This study contributes significantly to the existing literature by augmenting the growing body of empirical research exploring the relationship between competitiveness, economic freedom, and bank stability in emerging markets. Our research specifically targets five burgeoning ASEAN nations: Indonesia, the Philippines, Thailand, and Vietnam. These countries were chosen because their banking systems are primary financing mechanisms, making them pivotal for analysis. In order to enhance comparability and focus, we selected these five nations, categorized as developing economies, setting them apart from Singapore, which is considered a developed economy, and the less developed economies of Myanmar, Cambodia, and Laos. The insights derived from our study are likely to be valuable for policymakers and financial analysts in other developing and emerging economies. Our study also explores whether there is a nonlinear relationship between competitiveness and bank stability, building on the theoretical insights of Martinez-Miera and Repullo (2010). This investigation contributes to the growing academic interest in the dynamics between competition and bank stability, with a particular focus on developing nations. The findings from our analysis support the concept of competition-induced fragility, indicating that increased market dominance or reduced competition-might enhance overall bank stability. However, our study reveals that the relationship between competition and bank stability in the ASEAN-4 countries is non-linear. This suggests that while initial increases in market strength can improve stability, surpassing a certain threshold could negatively impact bank stability. Additionally, our data reveal a direct relationship between financial autonomy and economic freedom, alongside the resilience of financial institutions. This observation suggests that banks operating under more favorable regulatory and economic conditions are typically more robust and resilient. Furthermore, the findings highlight that banks with a significant market presence in countries characterized by or financial freedom tend to experience more volatility. This paradoxical effect underscores the complex dynamics between market forces and regulatory environments in shaping the stability of financial institutions.

Our study is structured as follows: Section 2 outlines the theoretical frameworks, reviews relevant empirical studies, and presents our hypotheses. Section 3 describes the research strategy, estimation methods, and variables used. Section 4 presents the

estimation results and robustness checks. Finally, Section 5 concludes with a summary of the findings and their implications.

2. Literature review

2.1. Competition and bank stability

Current research debates two main theories regarding the impact of competitiveness on bank stability. Keeley (1990) introduced the competition-fragility theory, which posits that increased competition reduces banks' market power and profit margins, leading them to engage in riskier behaviors. This theory was supported by observations from the U.S. in the 1980s, where deregulation and loosening of state branching restrictions increased competition and contributed to higher bank failure rates. In contrast, another theory suggests that monopoly-like dominance in banking enhances stability as established banks can better absorb demand and supply shocks, thus mitigating excessive risk-taking. Empirical evidence from Diallo (2015), Fungáčová and Weill (2013), and Berger and Bouwman (2009) suggests that decreased competition can enhance bank stability. Furthermore, studies by Ariss (2010) and Kouki and Al-Nasser (2017) indicate that increased market power can lead to greater stability and lower risk, particularly within the African banking sector. Boyd and De Nicolo (2005) noted that competition has a positive effect on bank stability, suggesting that increased competition contributes to observing that in more consolidated, less competitive markets, banks may use their market power to set higher interest rates. This can lead to increased moral hazard and make it more difficult for borrowers to repay loans, potentially leading to higher default rates and increased risk in bank portfolios. Supporting this view, Uhde and Heimeshoff (2009) found that banking markets in Eastern Europe that face less competition are more susceptible to financial instability, further underscoring the stabilizing effect of competition. Schaeck and Cihák (2014) also found that competition tends to enhance stability, particularly in banks that are already financially sound.

However, Martinez-Miera and Repullo (2010) critiqued these findings, arguing that greater competition among banks tends to lower loan rates, thereby decreasing the interest income that can protect against losses from loan defaults. This situation can lead to a reduction in the banks' buffer against defaults, suggesting a complex relationship between competition and bank stability. They introduced the idea of a U-shaped relationship between bank competition and the likelihood of failure, which was substantiated by research from Liu et al. (2013) across eleven European countries. Similarly, research from Jiménez et al. (2013) on the Spanish banking system raised questions about the applicability of the Martinez-Miera and Repullo model, challenging its empirical validity. Additionally, Carletti and Vives (2009) explore the intricate relationship between regulatory measures and competition policies in the banking industry. The authors analyze how different regulatory frameworks can impact the competitive dynamics within the sector, influencing the stability and efficiency of financial institutions. The study provides insights into the optimal balance between regulation and competition to promote a stable yet competitive banking environment, highlighting the importance of tailored policies that address the unique challenges of the banking industry. Matutes and Vives (2000) examine the

dynamics of imperfect competition within the banking sector, focusing on how it influences banks' risk-taking behaviors and the role of regulatory frameworks in mitigating associated risks. The study highlights the trade-offs between competition and risk, suggesting that appropriate regulation can balance these factors to ensure a stable banking environment. Furthermore, Vives (2009) emphasizes the complexity of regulating competition and stability in the banking sector. There needs to be a delicate balance between promoting competition and ensuring financial stability to achieve an efficient and safe banking system. Fu et al. (2014) suggest that greater concentration fosters financial fragility and that lower pricing power also induces bank risk exposure after controlling for a variety of macroeconomic, bank-specific, regulatory, and institutional factors. In terms of regulations and institutions, the results show that tougher entry restrictions may benefit bank stability, whereas stronger deposit insurance schemes are associated with greater bank fragility.

Recent studies reveal a complex link between competition and bank stability, influenced by factors not previously considered. Amidu and Wolfe (2013) examine how competition in emerging markets could lead to bank failures through strategies like income diversification. Ariss (2010) found that competition can undermine stability in developing and emerging economies. Amidu (2013) further supports this view, indicating that increased competition reduces bank stability. Kouki and Al-Nasseri (2017) also observed similar trends in their research. Additionally, Sarpong-Kumankoma et al. (2020) provide evidence supporting the competition-fragility hypothesis in Sub-Saharan Africa, highlighting that excessive market dominance may negatively influence bank stability.

H_1: There is a relationship between competition and bank stability

2.2. Economic freedom and bank stability

While extensive research has explored the impact of regulatory limits on various facets of banking, there is a scarcity of theoretical models that explicitly evaluate the influence of economic freedom on bank performance (Chortareas et al., 2013). Nevertheless, the body of research linking economic freedom to growth is expanding. Studies by De Haan and Sturm (2000), Adkins et al. (2002), Bengoa and Sanchez-Robles (2003), and Farhad et al. (2015) consistently find that economic flexibility enhances performance, suggesting that efficient economies contribute to greater bank stability.

Ahmed (2013) highlights the importance of institutional factors, such as economic independence, in understanding growth and financial development in Sub-Saharan Africa. Despite this, the link between economic freedom and bank performance is still not well-researched. Sufian and Habibullah (2010) found that economic independence has a positive impact on the performance of Malaysian banks. Additionally, Chortareas et al. (2013) conducted pioneering research on bank efficiency and financial freedom, using the Heritage Foundation's economic freedom index. Their study revealed that countries with higher financial openness generally have more cost-efficient banks. The Heritage Foundation's Economic Freedom Index evaluates the ability of individuals to control their labor and property without undue restraint. Economic independence in a society allows individuals to work, produce,

consume, and invest freely, with governments limiting their interventions to protecting and enhancing freedom. Financial freedom, a facet of economic freedom, pertains to the regulation of the financial sector. Less regulation typically encourages competition among financial institutions, thereby enhancing their efficiency. Sarpong-Kumankoma et al. (2020) found that financial and economic independence are positively correlated with bank profitability in Sub-Saharan Africa. Their research demonstrates that banks in countries with more financial autonomy and less stringent banking regulations tend to be more profitable than those in more regulated environments. Sufian (2014) argues that financial openness enhances the profitability of MENA Islamic banks. Lin et al. (2016) investigated how financial independence affects the cost efficiency of bank ownership changes in 12 Asian developing nations from 2003 to 2012. Utilizing the stochastic frontier analysis to estimate bank efficiency ratings, they found that foreign bank presence boosts efficiency, particularly in financially liberal states. It was noted that an increase in government ownership of domestic banks generally improves (reduces) bank efficiency in nations with greater financial freedom after a financial crisis. In a separate study, Cubillas and González (2014) found that financial liberalization (financial freedom) can heighten bank risk-taking through different channels, which vary based on the level of economic development or the institutional environment. Furthermore, Saqib et al. (2021) analyzed the responses of sectoral energy imports to exchange rate volatilities in Pakistan. The results suggest that in a liberalized economy, unstable exchange rates lead to energy imbalances and pose a potential risk of economic recession. In less economically developed nations, financial liberalization tends to destabilize banks by increasing risk-taking rather than competition. Conversely, in economically and institutionally developed countries, financial liberalization intensifies bank competition, potentially reducing stability. While the direct impact of economic freedom on bank stability remains less understood, Mavrakana and Psillaki (2019) suggest that economic freedom improves both bank performance and financial stability. In contrast, Ghosh (2016) argues that financial freedom increases bank risk and instability. Asteriou et al. (2016) point out that the effect of higher economic freedom on bank stability is variable, indicating that it can either decrease or increase stability depending on specific indicators. They advocate for economic freedom measures to be tailored to better capture the diversity in banking sectors across different countries. In developing nations with less mature institutions, deregulation of the banking sector can expand financial markets and intensify competition, potentially leading to instability. Our research hypothesizes that greater economic freedom correlates with increased bank instability due to intensified competition.

H_2: There is a relationship between economic freedom and bank stability.

3. Data and methodology

3.1. Data

Our data was sourced from various platforms. We used financial statements of banks and Refinitiv Eikon to collect bank-level data across four ASEAN countries. Among these, Indonesia has the highest number of banks, representing 33% of our

sample, followed by the Philippines, Thailand, and Vietnam. Singapore, being a developed country, was excluded from our sample. After removing entries with missing data, we compiled an unbalanced panel of 70 listed banks for the period from 2007 to 2019. Additionally, data on competition was sourced from the Global Financial Development Database (Čihák et al., 2012). Information on the economic freedom index was obtained from the Heritage Foundation. Lastly, data regarding economic growth and inflation rates were acquired from the World Bank database (World Bank, 2019).

3.2. Methodology

This study utilizes the Arellano and Bover (1995) Generalized Method of Moments (GMM) estimator, which is well-suited for the panel data structure. The GMM addresses two main issues: unobserved heterogeneity and endogeneity (Arellano, 2002). It accounts for the unobserved heterogeneity and the persistence of the dependent variable, thereby providing reliable and consistent parameter estimates. The efficiency of the projected coefficients is enhanced through the use of a diverse set of instruments. The system GMM estimator employs lagged values of the dependent variables (both in levels and differences) and lagged values of other potentially endogenous regressors as instruments for endogeneity. Following Bond's (2002) methodology, we use the prior values of the endogenous variables as instruments, which are highlighted in italics in the results table. Our methodology involves using instruments for all regressors, excluding those that are strictly exogenous. Strictly exogenous variables are presumed to have no correlation with individual effects, whereas endogenous variables are predetermined. Moreover, we employ the Arellano-Bond autocorrelation (AR) tests and Hansen's over-identifying constraints test to determine the appropriate number of lags. A rejection of the null hypothesis in the Hansen test suggests that the instruments do not meet the necessary orthogonality conditions. Additionally, the moment conditions are applicable only when there is no serial correlation in the idiosyncratic errors. If the null hypothesis of second-order autocorrelation (AR2) is not rejected, the moment conditions are considered valid. Our empirical model, similar to the one used by Liu et al. (2013), investigates the effects of competition and economic freedom on bank stability, leveraging these rigorous statistical techniques to ensure the robustness of our findings.

$$ZSCORE = \alpha_{i,t} + \alpha_1 ZSCORE_{i,t-1} + \alpha_2 Comp_{i,t} + \alpha_3 Comp2_{i,t} + \alpha_4 \text{free}_{i,t} + \alpha_5 Comp_{i,t} \times \text{free} + Bank\ controls_{i,t}$$

Following the methodology of prior studies such as Lepetit and Strobel (2013), we also employ the Z-score as a measure of bank stability. The Z-score of a bank is calculated as the sum of the return on assets (ROA) and the equity-to-assets ratio, divided by the standard deviation of ROA. This metric is used to estimate the probability of a bank's insolvency, with higher Z-score values indicating greater stability and lower risk of failure. This approach provides a standardized way to assess the financial health and resilience of banks across different markets and regulatory environments.

For our measure of competition, we followed the approach recommended by Davis et al. (2020), using data from the Global Financial Development Database. To assess the level of competition within the banking sector, we utilized the Lerner index.

This index measures the degree of market power by calculating the difference between the prices at which services are sold and the marginal costs of producing those services. Specifically, the pricing component is represented by the ratio of total bank revenue to its assets, and the marginal cost is estimated using a translog cost function related to production. Higher values of the Lerner index indicate less competition, as they reflect greater market control or dominance. The methodology for calculating the Lerner index aligns with the procedures described by Demirgüç-Kunt and Martínez Pería (2010). This index was computed using individual bank data sourced from Banks cope, providing a robust framework for evaluating competition in the banking industry.

The Economic Freedom Index (Free) is represented by two major indicators: the Economic Freedom of the World Index by the Fraser Institute (Gwartney et al., 2014) and the Heritage Foundation's Economic Freedom Index in collaboration with the Wall Street Journal. Heckelman and Stroup (2000) note that while the Heritage Index primarily focuses on policy measures that are under governmental control, the Fraser Index tends to reflect the outcomes of those policies. De Haan and Sturm (2000) indicate that both indices generally yield similar overall rankings. Despite the extensive use of the Economic Freedom of the World Index in scholarly research, we have chosen to utilize the Heritage Foundation's Index of Economic Freedom for our analysis. This decision is driven by the relevance of one of its components, the Financial Freedom Index, to our study's focus (Chortareas et al., 2013). Each of these freedoms is scored on a scale from 0 to 100, and a country's overall score is calculated by averaging the scores across these twelve freedoms, with each component weighted equally.

Financial freedom, one of the Heritage Foundation's 12 indicators of economic freedom, pertains to the efficiency of banking operations and the minimal government interference in the financial sector. Excessive government regulation of banks and other financial institutions, such as insurers and capital markets, tends to stifle competition and usually results in lower quality of financial services. Scores range from 0 to 100, with 100 indicating minimal government intervention. A score of 50 suggests significant government control over credit allocation and restrictions on financial institutions, particularly multinationals. Economies scoring below 50 are viewed as having repressive financial policies, characterized by extensive government control over the central bank and credit distribution.

3.3. Control variables

To account for bank size, we use SIZE, measured as the natural logarithm of total assets. The "too-big-to-fail" hypothesis suggests that larger banks tend to take on more risks, potentially leading to higher levels of bank insolvency (Beck et al., 2006). Conversely, some studies have reported opposite findings (Pennathur et al., 2012). LATA, or liquid assets to total assets, is utilized to control for liquidity risk. Generally, a higher liquidity ratio indicates greater bank stability (Shim, 2013). However, Delis and Staikouras (2011) argue that a higher liquidity ratio may also increase the risks faced by a bank. Additionally, ROA, or return on assets, is used to gauge profitability, with more profitable banks generally being better equipped to absorb financial shocks, thereby enhancing stability (Athanasoglou et al., 2008). Nonetheless, in scenarios

where bank regulation is inadequate and information asymmetry exists, higher profitability might also indicate higher risk premia (Hellmann et al., 2000). To further refine our analysis, GDP is included to control for the effects of economic growth, and INF is used to account for the impact of inflation on banking operations. These controls help isolate the effects of internal bank factors from external economic variables, allowing for a more nuanced understanding of what influences bank stability and risk.

4. Empirical results

4.1. Descriptive statistics

Table 1. The descriptive statistics of variables.

Variables	Obs	Mean	Std. Dev.	Min	Max
ZSCORE	1106	27.219	3.296	20.970	33.433
LERNER	663	0.293	0.094	−0.012	0.435
FINANCIAL FREEDOM	1106	49.358	11.177	30.000	70.000
ECONOMIC FREEDOM	1106	59.515	5.868	49.800	74.500
SIZE	1106	28.947	3.091	22.129	34.655
LATA	1106	0.127	0.075	0.004	0.336
ROA	1106	1.374	0.945	−2.357	3.847
GDP	1106	5.289	1.574	−1.500	7.500
INF	1106	5.350	4.993	−6.000	22.700

Table 2. The correlation matrix of variables.

	ZSCORE	LERNER	FINANCIAL FREEDOM	ECONOMIC FREEDOM	SIZE	LATA	ROA	GDP	INF
ZSCORE	1								
LERNER	−0.259	1							
FINANCIAL FREEDOM	0.250	0.412	1						
ECONOMIC FREEDOM	0.401	0.125	0.701	1					
SIZE	0.623	0.301	−0.386	−0.584	1				
LATA	0.000	−0.060	−0.175	−0.189	0.021	1			
ROA	0.152	0.090	0.175	0.060	0.057	0.086	1		
GDP	0.174	−0.013	−0.313	−0.371	0.234	0.248	0.049	1	
INF	0.266	−0.027	−0.537	−0.592	0.437	0.059	−0.122	0.392	1

Table 1 provides descriptive statistics for the variables analyzed in this study. The mean value of bank stability, as measured by the Z-score (ZSCORE), is 27.45. A high standard deviation in ZSCORE indicates significant volatility over the period studied. The Lerner index, which measures competition or market power, has an average value of 0.29, suggesting moderate market control by banks. Additionally, the financial freedom index has an average value of 49.3 in the ASEAN-4 nations,

indicating considerable restrictions on banking operations and the provision of financial services, which could adversely affect the operational efficiency of banks in the region. Conversely, the average level of economic freedom stands at 59.5, reflecting a relatively high degree of freedom to own and utilize capital in these countries.

Table 2 presents the pairwise correlation coefficients among the variables. Overall, the data in **Table 2** show no significant correlations between the independent variables used in our models, suggesting that multicollinearity is unlikely to be a concern in our analysis. This lack of strong correlations supports the robustness of the statistical tests applied to examine the relationships specified in our research model.

4.2. The base models

This section presents the empirical findings of our study. The results for our baseline models are displayed in **Table 3**. To limit the number of moment conditions, we restricted the use of lagged values of the dependent variable to just one, following the methodology proposed by Le and Ngo (2020). This approach suggests using a single lagged value to ensure the model remains simple, stable, and easier to estimate, while avoiding multicollinearity issues. Using multiple lagged values can lead to multicollinearity problems, where the lagged variables are highly linearly related to each other. This makes parameter estimation unstable and unreliable. The lagged dependent variable (Zscoret-1) shows significant coefficients across all models, indicating that the system GMM estimation is well-suited for this analysis.

The results reveal that the null hypothesis of the Hansen test, which tests for over-identification, cannot be rejected due to its statistically insignificant p-value. This suggests that the instruments used in the models are valid and there are no over-identification issues, confirming that the instrumental variables meet the necessary requirements. Although the null hypothesis of no first-order autocorrelation (AR1) in the first residual differences is rejected, this does not compromise the integrity of our model. This is evidenced by the insignificant p-value of the second-order autocorrelation test (AR2), affirming that the moment conditions of our model are upheld across all specifications. Given these findings, there is a strong justification for performing further diagnostic tests to ensure the robustness of our results.

In our analysis, the LERNER variable demonstrates a significant positive effect on the Z-score, as shown in **Table 3**. This indicates that when banks have the capacity to price their products in a monopolistic manner due to reduced competition, it lowers the risk of insolvency and enhances stability. This observation is consistent with findings from studies conducted in developing and emerging markets, such as those by Amidu (2013), Ariss (2010), and Sarpong-Kumankoma et al. (2020), supporting Keeley's (1990) competition-fragility hypothesis.

However, recent studies, such as Martinez-Miera and Repullo (2010), suggest the importance of examining a non-linear relationship to fully understand the complex link between competitiveness and bank stability. Our model explores this aspect, similar to Liu et al.'s (2013) investigation into European banks, and we find evidence that supports the existence of a nonlinear relationship between competition and bank stability.

Contrary to the generally positive influence of market power measured by Lerner's index, the squared term of Lerner (LERNER2) consistently shows a negative and significant impact on bank stability. This indicates that while initial increases in market power can enhance stability, excessive market dominance can conversely affect stability adversely if a certain threshold is surpassed. Therefore, the results suggest that maintaining a moderate level of competition within the banking sector might be the most beneficial approach for ensuring bank stability.

In all models examined, the direct effect of financial freedom on bank stability is consistently positive and statistically significant. This suggests that banks operating in regions with higher financial freedom typically demonstrate better stability or lower risk levels. These observations are in line with the study by Chortareas et al. (2013), which noted a positive impact of financial autonomy on bank performance. Greater operational freedom allows banks to engage in safer and more appropriate business practices, as opposed to environments where strict regulations may limit their activities. Moreover, the interaction between the Lerner index (LERNER) and financial freedom presents a significant negative effect on bank stability. This indicates that banks with greater market power in countries with more financial autonomy tend to face higher risks of instability. This could be attributed to the possibility that significant market control combined with financial freedom might encourage riskier business practices that, while potentially profitable, could destabilize the banks.

Additionally, there is a noticeable direct relationship between economic freedom and bank stability, reinforcing the idea that reduced regulatory oversight encourages banks to engage in diverse and innovative operations. This diversification allows banks to capitalize on economies of scale, generate revenue from unconventional sources, and enhance overall stability, as supported by findings from Khakpoor Moghadam (2013).

However, the interaction between Lerner index and economic freedom also shows a pronounced negative impact on bank stability. This suggests that while economic freedom generally promotes bank stability, in environments with limited banking competition and substantial market power, it can lead to increased vulnerability and a higher incidence of bank failures. This conclusion supports the research by Sarpong-Kumankoma et al. (2020), which found that in countries with minimal banking competition and high economic freedom, there is a greater likelihood of bank failures, highlighting the complex dynamics between market competition, regulatory environment, and bank stability.

The size of a bank plays a significant role and exerts a beneficial influence on its stability. Larger banks tend to have greater diversification and more experience in managing risks, leading to enhanced stability. This finding aligns with research by Son et al. (2016), who observed similar trends in bank management and risk mitigation.

Additionally, the liquidity ratio is found to have a positive impact on bank stability. Higher liquidity ratios indicate that banks are better positioned to handle sudden financial demands without compromising their operational integrity, aligning with findings by Shim (2013). Moreover, there is a noted positive correlation between bank stability and the profitability of banks, as indicated by Nguyen and Nguyen (2021). This suggests that more profitable banks are better equipped to absorb shocks

and maintain stability.

The relationship between GDP and ZSCORE also supports the traditional view that economic growth stimulates demand for banking services and products. During periods of economic upturn, banks often see increased profitability and stability, corroborated by studies from Athanasoglou et al. (2008) and Dietrich and Wanzenried (2014). Conversely, the adverse impact of inflation on ZSCORE suggests that high inflation rates can exacerbate repayment challenges for borrowers. As inflation diminishes the real value of financial resources, it can strain borrowers' liquidity and repayment capacity, potentially increasing default risks and thereby reducing bank stability, as outlined in the research by Pervan et al. (2015). These dynamics illustrate the complex interplay between macroeconomic factors and bank stability.

Table 3. Regression estimates.

	ZSCORE	**ZSCORE**	**ZSCORE**	**ZSCORE**	**ZSCORE**
$ZSCORE_{t-1}$	0.790*** (0.005)	0.788*** (0.002)	0.534*** (0.021)	0.791*** (0.002)	0.775*** (0.005)
LERNER	2.449*** (0.622)	1.327*** (0.290)	2.741* (1.513)	2.605*** (0.566)	6.560*** (1.642)
LERNER2	−4.504*** (1.078)	−2.084*** (0.522)	−4.528* (2.389)	−2.013*** (0.608)	−2.772** (1.322)
FINANCIAL FREEDOM		0.002*** (0.000)		0.013** (0.005)	
ECONOMIC FREEDOM			0.022*** (0.008)		0.011* (0.006)
LERNER* FINANCIAL FREEDOM				−0.029** (0.014)	
LERNER* ECONOMIC FREEDOM					−0.081*** (0.024)
SIZE	0.193*** (0.010)	0.204*** (0.006)	0.475*** (0.026)	0.202*** (0.006)	0.204*** (0.007)
LATA	0.557** (0.214)	0.661*** (0.126)	0.817** (0.316)	0.559*** (0.117)	0.450** (0.208)
ROA	0.096*** (0.021)	0.087*** (0.012)	0.096*** (0.027)	0.094*** (0.012)	0.058*** (0.016)
GDP	0.009*** (0.003)	0.010*** (0.002)	0.020*** (0.003)	0.010*** (0.002)	0.024*** (0.005)
INF	−0.002 (0.001)	0.000 (0.000)	−0.016*** (0.003)	0.001 (0.000)	−0.007*** (0.001)
Constant	−0.289*** (0.165)	−0.586*** (0.146)	−2.590 (0.771)	−1.048 (0.298)	−0.680 (0.444)
No. of Obs	584	584	584	584	584
No. of Groups	79	79	79	79	79
No of instruments	50	58	44	58	42
AR1 (*p*-value)	0.010	0.009	0.000	0.009	0.009
AR2 (*p*-value)	0.444	0.449	0.313	0.459	0.575
Hansen test (*p*-value)	0.351	0.168	0.478	0.168	0.134

Notes: Robust standard errors are in parentheses. *, ** and *** Significant at 10, 5 and 1 % levels, respectively.

4.3. Robustness check

4.3.1. Alternative of bank stability

Following the methodologies established by Galloway et al. (1997), Ghosh (2009), and Hovakimian and Kane (2000), we assess bank risk by measuring the annual volatility of weekly stock returns. Increased volatility in these returns typically indicates higher levels of risk and decreased stability within the banking sector.

Table 4. Robustness test: Alternative bank risk.

	RISK	**RISK**	**RISK**	**RISK**	**RISK**
$RISK_{t-1}$	0.106*** (0.011)	0.124*** (0.012)	0.799*** (0.120)	0.681*** (0.062)	0.577*** (0.056)
LERNER	−7.645*** (2.128)	−6.850*** (1.160)	−62.348*** (15.993)	−33.159*** (7.896)	−41.525*** (13.585
LERNER2	5.339* (3.296)	7.281*** (1.871)	94.276*** (23.067)	21.535 (14.639)	1.842 (11.963)
FINANCIAL FREEDOM		−0.032*** (0.003)		−0.088** (0.040)	
ECONOMIC FREEDOM			0.058 (0.035)		−0.176** (0.078)
LERNER* FINANCIAL FREEDOM				0.362*** (0.119)	
LERNER* ECONOMIC FREEDOM					0.682*** (0.236)
SIZE	0.029 (0.020)	−0.020 (0.016)	−0.026 (0.053)	0.060 (0.028)	−0.132** (0.064)
LATA	−10.093*** (1.078)	−9.027*** (1.021)	1.499 (1.276)	7.406 (1.466)	4.416 (1.650)
ROA	0.055 (0.060)	0.160 (0.037)	−0.700*** (0.205)	−0.183 (0.179)	−1.290*** (0.222)
GDP	−0.040*** (0.004)	−0.048*** (0.004)	0.060 (0.018)	0.023 (0.024)	−0.016* (0.008)
INF	0.212*** (0.021)	0.189*** (0.017)	0.045*** (0.013)	0.014 (0.015)	0.039** (0.016)
Constant	1.932 (0.633)	4.341 (0.622)	8.379 (2.416)	4.606 (1.591)	16.627 (5.250
No. of Obs	584	584	584	584	584
No. of Groups	79	79	79	79	79
No of instruments	51	58	27	22	21
AR1 (*p*-value)	0.000	0.000	0.009	0.024	0.081
AR2 (*p*-value)	0.517	0.832	0.768	0.230	0.122
Hansen test (*p*-value)	0.123	0.154	0.311	0.133	0.204

Notes: Robust standard errors are in parentheses. *, ** and *** Significant at 10, 5 and 1 % levels, respectively.

In **Table 4**, the analysis reveals that the Lerner index (LERNER) is negatively associated with bank risk, suggesting that higher levels of market power correlate with lower risk. Conversely, the squared Lerner index (LERNER2) is positively associated with bank risk, indicating that when market power exceeds a certain threshold, complacency and lack of control can lead to higher risk-taking in banks. Banks may

invest in risky loans or complex financial products without fully assessing the associated risks. Research indicates that banks with significant market power tend to invest in higher-risk assets, believing they can easily manage these risks (Keeley, 1990). Additionally, financial freedom (FINANCIAL FREEDOM) is negatively associated with bank risk, implying that more financial autonomy leads to lower risk. However, the interaction terms between financial freedom and economic freedom (ECONOMIC FREEDOM) with the Lerner index consistently show a positive coefficient toward bank risk. These results reinforce the conclusion that in environments with greater market power and high levels of financial and economic freedom, there is an increased likelihood of bank risk. This observation confirms our main findings, highlighting the nuanced interplay between market power, regulatory freedom, and bank risk dynamics.

4.3.2. Alternative of competition

To further validate our primary findings, we conducted additional tests to ensure their reliability and accuracy. Following the approach outlined by Mateev et al. (2022), we employ the BOONE indicator as a metric to assess the level of competition in the banking market, which is based on profit-efficiency. The Boone indicator measures the responsiveness of profits to changes in marginal costs; an increase in the Boone indicator signifies a reduction in competitive behavior among financial intermediaries. The data for Boone is sourced from the Global Financial Development Database.

The results presented in **Table 5** reveal a positive correlation between the BOONE indicator and bank stability, suggesting that less competitive behavior (or greater market power) is associated with increased stability. Conversely, the squared Boone indicator (BOONE2) shows a negative correlation with bank stability, indicating that excessive market power may undermine stability.

Additionally, the presence of financial freedom and economic freedom is associated with enhanced bank stability, suggesting that environments with greater autonomy and fewer regulatory constraints foster a more stable banking sector. However, the interaction between financial freedom and economic freedom, particularly in the context of the Boone indicator, consistently exhibits a negative coefficient in relation to bank stability. This result underscores the complex interplay between regulatory environments, market competition, and bank stability, supporting our initial findings that while certain levels of freedom and market power can benefit stability, excessive degrees of either may pose risks. Once again, our main discoveries are corroborated by these supplementary analyses, affirming the robustness of our research conclusions.

Table 5. Robustness checks when using the Boone variable.

	ZSCORE	ZSCORE	ZSCORE	ZSCORE	ZSCORE
$ZSCORE_{t-1}$	0.723*** (0.008)	0.664*** (0.004)	0.654*** (0.004)	0.633*** (0.002)	0.638*** (0.003)
BOONE	10.315** (4.145)	5.361*** (1.721)	6.868*** (1.620)	22.102*** (4.997)	71.688*** (6.675)
BOONE2	−50.405* (29.255)	−154.322*** (15.992)	−171.806*** (14.100)	−196.799*** (19.661)	−279.216*** (12.737)

Table 5. (*Continued*).

	ZSCORE	ZSCORE	ZSCORE	ZSCORE	ZSCORE
FINANCIAL FREEDOM		0.006*** (0.000)		0.014*** (0.002)	
ECONOMIC FREEDOM			0.027*** (0.001)		0.068*** (0.005)
BOONE * FINANCIAL FREEDOM				−0.297*** (0.080)	
BOONE * ECONOMIC FREEDOM					−0.982*** (0.112)
SIZE	0.263*** (0.011)	0.331*** (0.005)	0.368*** (0.006)	0.353*** (0.003)	0.411*** (0.006)
LATA	1.087*** (0.314)	0.886*** (0.182)	0.753*** (0.165)	1.101*** (0.153)	1.132*** (0.141)
ROA	0.034 (0.026)	0.181*** (0.018)	0.162*** (0.017)	0.124*** (0.011)	0.116*** (0.010)
GDP	0.002 (0.003)	0.002 (0.002)	0.003 (0.002)	0.008*** (0.001)	0.004*** (0.001)
INF	−0.006*** (0.001)	−0.003** (0.001)	−0.003*** (0.000)	−0.000 (0.000)	0.001 (0.000)
Constant	−0.399 (0.282)	−0.968*** (0.173)	−3.091 (0.239)	−1.163 (0.179)	−6.388 (0.437)
No. of Obs	624	624	624	624	624
No. of Groups	78	78	78	78	78
No. of instruments	44	58	58	66	66
AR1 (p-value)	0.009	0.009	0.010	0.009	0.009
AR2 (p-value)	0.366	0.593	0.632	0.589	0.636
Hansen test (p-value)	0.682	0.128	0.114	0.258	0.103

Notes: Robust standard errors are in parentheses. *, ** and *** Significant at 10, 5 and 1 % levels, respectively.

5. Conclusion

This study analyzes the impact of competition and economic freedom on bank stability using the System Generalized Method of Moments (GMM) to assess data from banks in the ASEAN-4 countries from 2007 to 2019. We explore how economic freedom interacts with competition, supporting the competition-fragility theory that increased market dominance typically enhances bank stability. However, the relationship is non-linear, indicating that excessive market power can undermine stability, highlighting the need for a moderate competition level in the banking sector. The research also finds that financial and economic freedom positively affects bank stability, suggesting that banks in freer economic environments are generally more stable and less risky. On the contrary, banks with greater market power in more economically free countries show higher instability, pointing to potential risks in less competitive banking sectors with high economic freedom. This study provides important policy implications for the stability of the banking system in ASEAN-4 countries. Firstly, maintaining a moderate level of competition in the banking sector

is essential. The research indicates that moderate competition enhances bank stability, while too little or too much competition can pose risks. Therefore, policies should aim to create a healthy competitive environment where no single bank holds excessive dominance. Secondly, encouraging economic and financial freedom is crucial. The study finds that economic and financial freedom positively impact bank stability, suggesting that policies should facilitate free economic activities and regulatory reforms to promote a transparent, barrier-free business environment. However, stricter supervision is needed for banks with significant market power to ensure they do not misuse their position to engage in high-risk behaviors. Policies should also consider limiting excessive market power, such as capping market share or controlling mergers and acquisitions in the banking sector, to prevent potential risks from excessive concentration of power in a few banks. Lastly, regulatory authorities should develop a flexible legal framework that can adjust according to the level of competition and economic freedom, ensuring the banking sector operates stably and safely. Furthermore, control variables like bank size, liquidity ratio, return on assets, and GDP positively affect stability, while inflation negatively impacts it. These insights are crucial for policymakers aiming to bolster bank stability in the ASEAN region.

This study has certain limitations to consider. Firstly, our research is based on data from listed commercial banks, which suggests the potential for further investigation into non-listed banks to determine if findings vary across different types of banking institutions. Secondly, although our focus is on developing ASEAN countries, there are notable institutional differences between developing and emerging economies. Therefore, it would be beneficial for future research to expand the scope to include other emerging economies to enhance the robustness and applicability of the findings. This expansion could provide more comprehensive insights by comparing and contrasting the banking stability across a broader economic spectrum. Finally, the adoption of AI, blockchain, and emerging technologies can profoundly impact the relationship between competition, economic freedom, and bank stability. These technologies not only drive competition and economic freedom but also contribute to the stability of the banking system by improving risk management and increasing transparency. To maximize the benefits of new technologies, banks and regulators need to develop comprehensive strategies to protect the financial system and promote sustainable development. Therefore, it would be beneficial for future research.

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