



Credit Spread Risk in The Banking Book and Treasury Stability: Evidence from Indonesian Banks

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ABSTRACT

This study examines the relationship between Credit Spread Risk in the Banking Book (CSRBB) and treasury stability and the moderating role of audit in the Indonesian banking sector. Using panel data from four banks over the 2021–2025 period, the study analyzes 20 bank-year observations using pooled OLS, fixed effects, and moderated regression analysis. The pooled OLS results show that CSRBB has a statistically significant negative association with treasury stability ($\beta = -4.179$; $p = 0.003$). However, this association becomes statistically insignificant in the fixed effects model ($\beta = 0.320$; $p = 0.714$), indicating that the pooled result is not maintained after controlling for bank-specific effects. The fixed effects model also indicates significant differences in treasury stability across selected banks relative to the reference category. The interaction between CSRBB and Audit is statistically insignificant ($\beta = 0.025$; $p = 0.879$), providing no empirical support for the proposed moderating role of Audit in the observed sample. Overall, the findings indicate that the CSRBB treasury stability relationship is sensitive to model specification and should be interpreted in light of the limited sample size and variation in the Audit measure.

INTRODUCTION

The increasing complexity of financial markets has significantly transformed the risk landscape faced by banking institutions. Traditionally, risk management in the banking book focused primarily on interest rate risk, however, recent regulatory developments have emphasized the importance of Credit Spread Risk in the Banking Book (CSRBB) as a distinct and material source of risk. According to McKinsey & Company, following the European Banking Authority guidelines, European banks have increasingly allocated capital to CSRBB, while adopting diverse approaches in defining credit spreads, setting portfolio concentration limits, and developing risk management frameworks to address CSRBB across the economic cycle (Bohn & Martinez, 2025)(Prashanth et al., 2026).

CSRBB is defined as the risk of changes in the economic value of banking book portfolios due to shifts in market perceptions of credit risk, as reflected in movements in credit spreads even when the underlying credit worthiness remains unchanged (Wosko, 2025). Banks face various risks that can affect their financial performance, including changes in interest rates and credit spreads, which are critical for maintaining stability and protecting stakeholders (Segal, 2025). Banking book portfolios typically consist of long term assets such as loans and fixed income securities that are not actively traded. These instruments are highly sensitive to changes in credit spreads arising from macroeconomic instability, changes in credit ratings, and shifts in market sentiment (Jainuri & Kunaifi, 2026). An increase in credit spreads can reduce the market value of these assets, thereby exerting pressure on treasury functions responsible for maintaining liquidity, capital adequacy, and earnings stability (Blöchliger, 2021; Yi, 2014; Zhang & Wu, 2011).

However, prior banking research in Indonesia has predominantly relied on conventional financial ratio based approaches. Studies over the past five years consistently employ indicators such as Capital Adequacy Ratio (CAR), Non Performing Loan (NPL), Loan to Deposit Ratio (LDR), and Return on Assets (ROA) as the primary variables in analyzing banking performance and stability. Research by (Pradigdo et al., 2025; Andini & Malini, 2026) demonstrates that these ratios remain the

main determinants in explaining bank profitability and credit growth. Furthermore, other studies highlight CAR, NPL, and LDR as key indicators for assessing banking risk and performance. In addition, (Rizkison et al., 2025; Munthe et al., 2025) confirm that empirical approaches in this area are still largely focused on examining relationships among financial ratios using linear regression, panel regression, and dynamic models such as Vector Autoregression (VAR).

The dominance of financial ratio based approaches is further reinforced by several studies within the same period, such as (Hariyanto & Maryono, 2025) non-performing loan (NPL), which employ variables such as CAR, NPL, LDR, BOPO, and NIM as primary proxies in analyzing bank performance. Moreover, findings from recent systematic literature reviews indicate that these variables remain the most commonly used measures in the Indonesian banking literature over the 2020 until 2026 period. This condition suggests that domestic banking research is still predominantly oriented toward credit risk and internal financial indicator set, with limited incorporation of more complex market based risk dimensions (Murtiningrum & Wahyuningsih, 2024).

This research utilizes secondary data obtained from the published annual reports of major Indonesian banking institutions, namely Bank Mandiri, Bank Syariah Indonesia (BSI), Bank Rakyat Indonesia (BRI), and Bank Negara Indonesia (BNI), covering the period from 2021 to 2025. These reports provide comprehensive financial and risk related disclosures, including information on treasury activities, asset composition, capital adequacy, and market risk exposure, which are essential for analyzing the dynamics of CSRBB and its impact on treasury stability. The selection of these banks is based on their significant market share, systemic importance, and active involvement in treasury operations, ensuring the reliability and relevance of the dataset in capturing both accounting based and market based risk indicators within the Indonesian banking sector.

Despite the growing body of literature on banking stability, existing studies remain largely anchored in accounting based indicators, with limited integration of forward looking, market based risk measures such as CSRBB. This omission

is particularly critical in emerging markets, where sensitivity to credit spread dynamics is often amplified by macro financial volatility. Furthermore, the moderating role of governance mechanisms especially audit functions in shaping the transmission of CSRBB to treasury stability remains insufficiently theorized and empirically tested. Addressing these gaps, this study advances the literature by positioning CSRBB as an important market based risk measure examined in relation to treasury stability. By bridging market based risk metrics with internal governance frameworks, this research offers a novel, integrative perspective that enhances both the theoretical understanding and practical application of risk management in the banking sector.

The Effect of CSRBB on Treasury Stability

CSRBB represents the risk of changes in portfolio value resulting from fluctuations in credit spreads, which directly affect the valuation of financial instruments. Changes in credit spreads are driven by macroeconomic factors and market volatility and have a significant impact on bond values and financial portfolio stability (Clark & Baccar, 2018). In addition, recent studies on CSRBB indicate that credit spread shocks can influence bank portfolio structure and increase balance sheet instability, particularly in the medium and long term (Erzurumlu et al., 2025). In a treasury context, an increase in CSRBB leads to higher portfolio value volatility and weaker bank financial stability.

To empirically examine this relationship, this study utilizes secondary data derived from the published annual reports of major Indonesian banks, namely Bank Mandiri, Bank Syariah Indonesia (BSI), Bank Rakyat Indonesia (BRI), and Bank Negara Indonesia (BNI), covering the period from 2021 to 2025. These reports provide detailed disclosures on financial performance, asset allocation, treasury activities, and market risk exposure, which are essential for capturing the dynamics of Credit Spread Risk in the Banking Book (CSRBB) and its implications for treasury stability. The selection of these banks is based on their systemic importance, large asset base, and active treasury operations, ensuring that the dataset reflects both accounting based and market based risk conditions within the Indonesian banking sector.

H1: CSRBB has a negative association on treasury stability.

The Effect of Duration on Treasury Stability

Duration reflects the sensitivity of portfolio value to changes in interest rates and market conditions. The literature review shows that changes in credit spreads and market volatility have a direct impact on bond pricing and portfolio risk (Clark & Baccar, 2018). Furthermore, the interaction between credit risk and liquidity risk has been identified as a key determinant of bond spreads, which ultimately affects financial system stability (Wu et al., 2022). The higher the duration, the greater the sensitivity to market changes, thereby potentially reducing treasury stability.

To empirically support this relationship, this study utilizes secondary data obtained from the annual reports of Bank Mandiri, Bank Syariah Indonesia (BSI), Bank Rakyat Indonesia (BRI), and Bank Negara Indonesia (BNI) over the period 2021–2025. These reports provide detailed information on asset composition, maturity structure, interest rate risk exposure, and treasury portfolio management, which are essential for measuring duration and its impact on financial stability. The selection of these banks is based on their systemic importance and significant involvement in treasury activities, ensuring that the data accurately reflects the sensitivity of banking portfolios to market risk in the Indonesian context.

H2: Duration has a negative association on treasury stability.

The Effect of Audit on Treasury Stability

From a corporate governance perspective, audit serves as a key control mechanism in ensuring the effectiveness of bank risk management. Strengthening internal control systems can enhance financial stability and reduce systemic risks within the banking sector (Kara, 2016). A strong audit function improves transparency, accountability, and the quality of internal supervision, thereby strengthening banks' ability to manage financial risks (Hughen, 2026). Recent studies indicate that strong governance structures and capital adequacy have a significant impact on bank stability and performance sustainability (Ie et al., 2025). In addition, other research confirms that effective

credit risk management and internal supervision improve bank stability by reducing exposure to systemic risk (Maulana et al., 2025). Therefore, effective auditing strengthens risk discipline and enhances treasury stability.

To support this analysis, this study utilizes secondary data obtained from the annual reports of Bank Mandiri, Bank Syariah Indonesia (BSI), Bank Rakyat Indonesia (BRI), and Bank Negara Indonesia (BNI) for the period 2021–2025. These reports provide comprehensive disclosures on governance structures, audit committee activity, internal control systems, and treasury performance, enabling a more robust evaluation of the role of audit in maintaining financial stability. The selection of these banks reflects their systemic importance and well established governance frameworks, which are essential for examining the effectiveness of audit mechanisms within the Indonesian banking sector. **H3:** Audit has a positive association on treasury stability.

The Moderating Role of Audit in the Relationship between CSRBB and Treasury Stability

Audit not only functions as an independent variable but also as a moderating mechanism that strengthens the effectiveness of bank risk management. In modern banking regulation frameworks, strong internal supervision can reduce the negative impact of market risk on financial stability through improved early detection and risk control (Bohn & Marinez, 2025; Alsulmi et al., 2024). Empirical studies show that strong governance mechanisms can reduce the impact of market volatility and enhance banking system resilience against external shocks. Therefore, audit acts as a buffer mechanism that weakens the negative effect of CSRBB on treasury stability.

To empirically examine this moderating effect, this study utilizes secondary data derived from the annual reports of Bank Mandiri, Bank Syariah Indonesia (BSI), Bank Rakyat Indonesia

(BRI), and Bank Negara Indonesia (BNI) over the period 2021–2025. These reports provide detailed disclosures on audit committee activity, governance practices, risk management frameworks, and treasury performance, enabling a comprehensive assessment of how audit mechanisms interact with market based risks such as CSRBB. The selection of these banks is based on their systemic importance and the robustness of their governance structures, ensuring the reliability of the analysis within the Indonesian banking context.

H4: Audit moderates the negative association between CSRBB and treasury stability.

This research model examines the relationship between CSRBB, Duration, Audit, and Treasury Stability. The dependent variable in this study is Treasury Stability (Y), which is influenced by three independent variables, namely CSRBB (X_1), Duration (X_2), and Audit (X_3). CSRBB is hypothesized to have a negative effect on Treasury Stability (H1), indicating that higher credit spread risk may reduce the stability of the treasury portfolio. Duration is also expected to have a negative effect on Treasury Stability (H2), as longer duration assets tend to increase sensitivity to interest rate and market fluctuations. In contrast, Audit is proposed to have a positive effect on Treasury Stability (H3), suggesting that stronger audit functions can improve risk control and enhance financial stability.

In addition, this study introduces Audit as a moderating variable in the relationship between CSRBB and Treasury Stability. Specifically, Audit is expected to weaken the negative impact of CSRBB on Treasury Stability (H4), meaning that effective audit mechanisms can mitigate the adverse effects of credit spread risk within the banking book. Overall, this conceptual framework highlights both direct and moderating effects in explaining how risk factors and governance mechanisms interact to influence treasury stability in banking institutions.

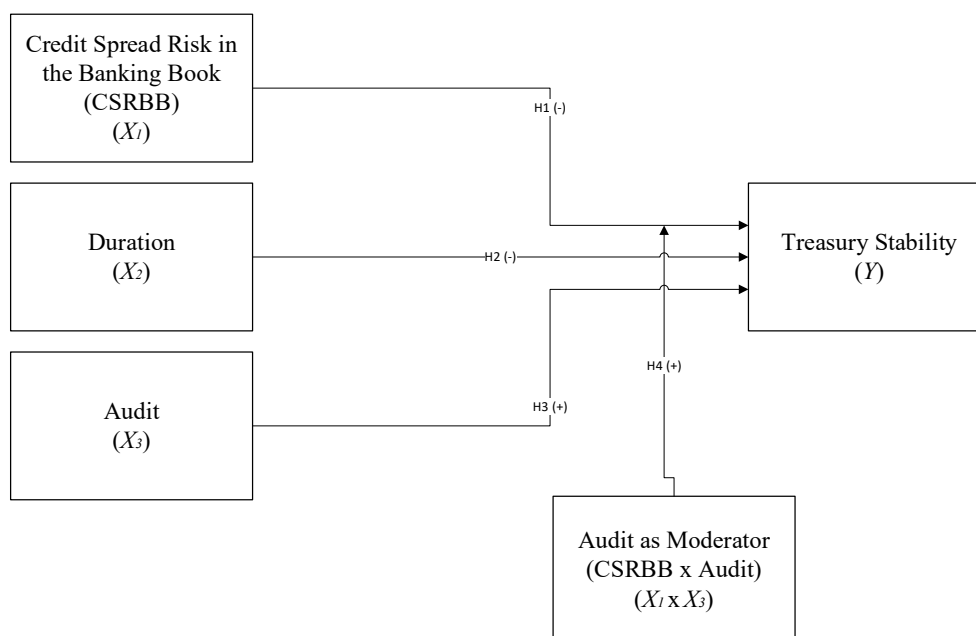


Figure 1. Research Model and Hypotheses

RESEARCH METHODS

This study employs a quantitative approach with an explanatory research design aimed at examining the empirical relationships between Credit Spread Risk in the Banking Book (CSRBB), Duration, Audit, and Treasury Stability. Audit is also examined as a moderating variable in the relationship between CSRBB and Treasury Stability. The empirical model uses panel data to capture variations across banks and observation years during the 2021-2025 period.

The population of this study consists of major banking institutions in Indonesia, with a sample comprising Bank Mandiri, Bank Rakyat Indonesia (BRI), Bank Negara Indonesia (BNI), and Bank Syariah Indonesia (BSI). The observation period spans from 2021 to 2025, resulting in a balanced panel dataset. The data are derived from published annual reports, which provide comprehensive information on financial performance, risk exposure, governance structure, and treasury activities.

The final sample consists of four banks observed over five consecutive years, resulting in 20 bank-year observations in a balanced panel. The relatively small number of observations limits statistical power and may affect the precision and reliability of the estimated coefficients, particularly in the moderated regression analysis. The findings should therefore be interpreted within the scope of the four sampled banks and the 2021-2025 observation period rather than generalized to the entire Indonesian banking industry. The limited number of observations also requires careful interpretation of statistically insignificant relationships, as the absence of statistical significance does not necessarily indicate the absence of an underlying empirical relationship.

The study uses four main variables, Treasury Stability as the dependent variable, CSRBB and Duration as explanatory variables, and Audit as the moderating variable. The measurement of each variable is based on information reported in the annual reports and corporate governance disclosures of the sampled banks for the 2021-2025 observation period.

Table 1. Variable Measurement and Operationalization

Variable	Role	Operational Definition	Measurement or Calculation Basis	Unit	Data Source
Treasury Stability	Dependent variable	Treasury performance represented by the bank's net interest margin or equivalent margin measure for Islamic banking operations.	NIM as reported by conventional banks. For BSI, the equivalent reported margin measure, Net Sharing Margin (NSM), is used.	Percentage (%)	Annual Report, financial highlights and financial ratios
CSRBB	Independent variable	Credit Spread Risk in the Banking Book, representing the observed sensitivity of the banking book to credit-spread and market-risk conditions.	A scaled CSRBB measure derived from the market-risk information disclosed by each sampled bank for each observation year. The same scaling procedure was applied consistently across all bank-year observations.	Scaled index	Annual reports and market-risk disclosures
Duration	Independent variable	Duration of the bank's relevant securities and financial instrument portfolio, representing sensitivity to changes in market conditions.	Duration was measured in years based on the duration estimate reported or derived from the maturity and portfolio characteristics disclosed in the bank's treasury and market-risk information.	Years	Annual Report, treasury and market-risk disclosures
Audit	Moderating variable	Audit oversight intensity represented by the annual frequency of Audit Committee meetings.	total number of Audit Committee meetings held during fiscal year tt..	Meetings per year	Annual Report and Corporate Governance Report

To test the hypotheses, this study applies the following panel regression model:

Main Model :

$$TS_{it} = \beta_0 + \beta_1 CRSBB_{it} + \beta_2 Duration_{it} + \beta_3 Audit_{it} + \epsilon_{it}$$

Moderated Regression Analysis (MRA):

$$TS_{it} = \beta_0 + \beta_1 CRSBB_{it} + \beta_2 Duration_{it} + \beta_3 Audit_{it} + \beta_4 (CRSBB_{it} \times Audit_{it}) + \epsilon_{it}$$

where:

TS_{it} : Treasury Stability of bank i at time t ;

β_0 : intercept;

$\beta_1 - \beta_4$: regression coefficients;

$CRSBB_{it}$: CSRBB of Bank i in year t ;

$Duration_{it}$: Duration;

$Audit_{it}$: Audit;

$(CRSBB_{it} \times Audit_{it})$: Interaction term;

ϵ_{it} is the error term.

The dataset is structured in a panel format using financial and governance indicators extracted from the annual reports of selected banks. Data processing and statistical analysis are conducted using the Python programming language, which is widely utilized in empirical banking and financial

research. The analysis employs panel regression models, including the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM), along with model selection procedures such as the Chow test, Hausman test, and Lagrange Multiplier (LM) test.

Furthermore, to ensure the robustness and validity of the estimated models, several diagnostic tests are performed prior to hypothesis testing. These include multicollinearity testing using the Variance Inflation Factor (VIF), heteroskedasticity testing, and autocorrelation testing. The purpose of these tests is to ensure that the regression model satisfies the classical assumptions and produces unbiased and consistent estimators.

Following the model selection procedures, the most appropriate panel regression model is determined based on statistical criteria. Hypothesis testing is then conducted using the selected model by evaluating the significance of regression coefficients at conventional significance levels (1%, 5%, and 10%). The coefficient of determination (R^2) is used to assess the explanatory power of the model, while the F statistic is employed to evaluate the overall significance of the regression model. In addition, the moderating effect of audit on the relationship between CSRBB and treasury stability is examined using Moderated Regression Analysis (MRA) by incorporating an interaction term between CSRBB and audit. The results are interpreted to determine whether audit strengthens or weakens the relationship between credit spread risk and treasury stability in the banking sector.

RESULTS AND DISCUSSION

Descriptive Statistics

To provide an initial overview of the data characteristics, descriptive statistics are presented to summarize the distribution of each research variable. This analysis includes the mean, minimum, maximum, and standard deviation values, which reflect both the central tendency and variability of the data across banks and observation periods.

Table 2. Descriptive Statistics

Variable	Mean	Std. Dev	Min	Max
Treasury Stability	5.793	1.202	4.3	8.23
CSRBB	-1.692	0.212	-1.95	-1.25
Duration	4.225	0.097	4.1	4.4
Audit	25.4	3.733	21	32

The descriptive statistics of the study variables are presented in Table 2. The average value of Treasury Stability is 5.793, with a minimum of 4.300 and a maximum of 8.230, indicating variation in treasury performance across banks and observation periods. The CSRBB variable has a mean of -1.692, with values ranging from -1.950 to -1.250 and a standard deviation of 0.212. Duration has a mean of 4.225 and ranges from 4.100 to 4.400, indicating relatively limited variation across the observations. Meanwhile, Audit has a mean of 25.400, with values ranging from 21 to 32 and a standard deviation of 3.733. Overall, the descriptive statistics indicate

greater variation in Treasury Stability than in CSRBB and Duration, while the Audit measure also shows limited variation across the observed banks and years.

Panel Model Selection

To determine the most appropriate panel data model, this study employs three standard tests, namely the Chow test, Hausman test, and Lagrange Multiplier (LM) test, to select between the pooled ordinary least squares (Pooled OLS), fixed effect model (FEM), and random effect model (REM). The Chow test results indicate that the fixed effect model is preferred over the pooled OLS model, as the probability value is statistically significant ($p < 0.01$), suggesting the presence of significant differences across banks. Furthermore, the Hausman test shows that the fixed effect model is more appropriate than the random effect model ($p < 0.05$), implying that individual bank effects are correlated with the explanatory variables and FEM is selected to account for bank specific heterogeneity in the panel structure. In addition, the LM test reveals that the random effect model is superior to the pooled OLS model ($p < 0.01$), indicating that panel data estimation is more suitable than a simple pooled approach. Overall, based on the combined results of these tests, the fixed effect model is selected as the most appropriate model for this study, as it effectively captures bank specific heterogeneity and provides more reliable estimation results.

Pooled OLS Regression Results

Following the descriptive analysis, the study proceeds with a pooled ordinary least squares (OLS) regression to examine the baseline relationship between CSRBB, duration, audit, and treasury stability.

Table 3. Pooled OLS Regression Results

Variable	Coefficient	t Statistic	Prob.
Intercept	15.405	1.535	0.144
CSRBB	-4.179	-3.463	0.003
Duration	-3.759	-1.484	0.157
Audit	-0.032	-0.47	0.645
Model Summary			
R squared		0.442	
Adj. R squared		0.338	
F statistic		4.229	
Prob (F stat)		0.022	

The pooled regression results show that CSRBB has a statistically significant negative association with treasury stability ($\beta = -4.179$; $p = 0.003$). This result indicates that higher credit spread risk exposure is associated with lower treasury stability in the pooled specification, holding Duration and Audit constant. In contrast, Duration ($\beta = -3.759$; $p = 0.157$) and Audit ($\beta = -0.032$; $p = 0.645$) do not show statistically significant associations with treasury stability. The model is statistically significant overall ($F = 4.229$; $p = 0.022$) and explains 44.2% of the variation in treasury stability, with an adjusted R^2 of 0.338.

Fixed Effect Model (Bank)

To address potential heterogeneity across banks, the analysis is extended using a fixed effect model. This approach controls for unobserved, time invariant characteristics specific to each bank that may influence treasury stability.

Table 4. Fixed Effect Model Results (Bank)

Variable	Coefficient	t Statistic	Prob.
Intercept	3.219	0.725	0.481
BRI	3.213	7.326	0
BSI	1.586	4.384	0.001
Mandiri	0.646	1.794	0.096
CSRBB	0.32	0.375	0.714
Duration	2.081	1.728	0.108
Audit	0.024	0.761	0.46
Model Summary			
Indicator	Value		
R squared	0.933		
Adj. R squared	0.902		
F statistic	30.31		
Prob (F stat)	0.000		

The fixed effects model provides substantially higher explanatory power, with an R^2 of 0.933 and an adjusted R^2 of 0.902. Bank-specific effects are included in the model to account for unobserved, time-invariant characteristics across banks. BNI serves as the reference category; therefore, the coefficients for BRI, BSI, and Mandiri represent differences in treasury stability relative to BNI. BRI has a positive and statistically significant coefficient ($\beta = 3.213$; $p < 0.001$), while BSI also has a positive and statistically significant coefficient ($\beta = 1.586$; $p = 0.001$). Mandiri has a positive coefficient that is

statistically significant at the 10% level ($\beta = 0.646$; $p = 0.096$). In contrast, CSRBB is statistically insignificant in the fixed effects model ($\beta = 0.320$; $p = 0.714$), as are Duration ($\beta = 2.081$; $p = 0.108$) and Audit ($\beta = 0.024$; $p = 0.460$). These results indicate that the significant negative association between CSRBB and treasury stability identified in the pooled specification is not maintained after controlling for bank-specific effects. The change in the CSRBB coefficient from -4.179 in the pooled OLS specification to 0.320 in the fixed effects model suggests that differences across banks may account for part of the pooled association, while the within bank variation in CSRBB is not statistically associated with treasury stability in the fixed effects specification.

Moderated Regression Analysis (MRA)

To further examine the role of audit as a moderating variable, the interaction between CSRBB and audit is incorporated into the regression model.

Table 5. Moderated Regression Analysis (MRA)

Variable	Coefficient	t Statistic	Prob.
Intercept	2.061	0.235	0.818
BRI	3.217	7.041	0
BSI	1.590	4.217	0.001
Mandiri	0.656	1.727	0.11
CSRBB	0.916	0.233	0.82
Audit	0.066	0.24	0.814
CSRBB $\times$ Audit	0.025	0.156	0.879
Duration	2.044	1.603	0.135
Model Summary			
Indicator	Value		
R squared	0.933		
Adj. R squared	0.895		
F statistic	24.03		
Prob (F stat)	0.000		

The moderated regression results show that the interaction between CSRBB and Audit is statistically insignificant ($\beta = 0.025$; $p = 0.879$). Therefore, the analysis does not provide empirical support for the proposed moderating role of Audit in the relationship between CSRBB and treasury stability. CSRBB ($\beta = 0.916$; $p = 0.820$) and Audit ($\beta = 0.066$; $p = 0.814$) are also statistically insignificant in the moderated model. The insignificant interaction coefficient indicates that the relationship between

CSRBB and treasury stability does not vary systematically according to the Audit measure in the observed sample. This result may be related to the limited variation in the Audit measure and the small number of bank-year observations, which can constrain the ability of the model to identify moderation effects.

Taken together, the results indicate that the relationship between CSRBB and treasury stability is sensitive to the estimation specification. CSRBB shows a statistically significant negative association with treasury stability in the pooled model ($= -4.179$; $p = 0.003$), but becomes statistically insignificant in the fixed effects model ($= 0.320$; $p = 0.714$). This difference indicates that the pooled association is not maintained after controlling for bank-specific effects. The significant coefficients of the bank-specific indicators further indicate differences in treasury stability relative to the reference category, BNI. The moderation analysis also does not provide statistical support for the role of Audit in altering the relationship between CSRBB and treasury stability ($= 0.025$; $p = 0.879$). Given the small sample of 20 bank year observations and the limited variation in the Audit measure, these findings should be interpreted within the scope of the observed banks and period. Future research may extend the sample and observation period and incorporate additional governance and risk management variables.

CONCLUSION

This study examines the relationship between Credit Spread Risk in the Banking Book (CSRBB) and treasury stability, as well as the moderating role of audit in the Indonesian banking sector. Using panel data from four banks over the 2021-2025 period, the analysis applies pooled OLS,

fixed effects, and moderated regression models. The pooled OLS results show that CSRBB has a statistically significant negative association with treasury stability ($= -4.179$; $p = 0.003$). However, this relationship becomes statistically insignificant in the fixed effects model ($= 0.320$; $p = 0.714$). The results indicate that the negative association identified in the pooled specification is not maintained after controlling for bank-specific effects.

The fixed effects results also show statistically significant differences in treasury stability for BRI and BSI relative to BNI, the reference category, while Mandiri is significant at the 10% level. These findings indicate that bank-specific heterogeneity is an important factor in explaining differences in treasury stability within the observed sample. The difference between the pooled OLS and fixed effects results shows that the relationship between CSRBB and treasury stability is sensitive to the estimation specification and should not be interpreted as a consistent relationship across models.

The moderated regression analysis shows that the interaction between CSRBB and Audit is statistically insignificant ($= 0.025$; $p = 0.879$). Therefore, the empirical results do not support the proposed moderating role of Audit in the relationship between CSRBB and treasury stability. This finding is interpreted within the context of the 20 bank-year observations and the limited variation in the Audit measure. Overall, the empirical evidence shows a significant negative CSRBB treasury stability association in the pooled specification, but not in the fixed effects specification, while the moderating role of Audit is not supported in the observed sample. Future research may extend the observation period, include a broader sample of banks, and incorporate additional governance and risk management variables.

REFERENCE

- Alsulmi, F., Mahmood, R., & Sapar, R. (2024). The Effects of Credit , Liquidity , and Operational Risks on GCC Bank Financial Stability : Moderating Role of Board Size. *Advances in Social Sciences Research Journal*, 11(11), 191–207. <https://doi.org/https://doi.org/10.14738/assrj.1111.17840>
- Andini, N., & Malini, H. (2026). The influence of non-performing loans (NPL), loan to deposit ratio (LDR), return on assets (ROA), and capital adequacy ratio (CAR) on credit growth in commercial banks in Indonesia. *Journal Economic and Business*, 5(1). <https://doi.org/10.56495/ejeb.v5i1.1374>
- Blöchliger, A. (2021). Interest rate risk in the banking book : A closed-form solution for non-maturity deposits R. *Journal of Banking and Finance Journal Homepage: Www.Elsevier.Com/Locate/Jbf Interest*, 125. <https://doi.org/10.1016/j.jbankfin.2021.106080>
- Bohn, A., & Martinez, J. (2025). Confronting new risk management guidelines for credit spread risk. *McKinsey & Company, February*, 1–9. <https://www.mckinsey.com/capabilities/risk-and-resilience/our-insights/confronting-new-risk-management-guidelines-for-credit-spread-risk-in-banking>
- Clark, E., & Baccar, S. (2018). Modelling credit spreads with time volatility , skewness , and kurtosis. *Annals of Operations Research*, 262(2), 431–461. <https://doi.org/10.1007/s10479-015-1975-5>
- Erzurumlu, Y., Kirik, A., & Oygur, T. (2025). Dynamic Modelling of Shocks to Credit Spread Risk in Banking Book: Evidence from European Sovereign Markets. *North American Journal of Economics and Finance*, 86(1), 32. <https://doi.org/10.1016/j.najef.2026.102688>
- Hariyanto, M. D., & Maryono. (2025). Analysis of the effect of financial ratios on return on assets (roa) in banking companies in 2020-2024. *Journal of Economic, Business and Accounting*, 8(4), 1794–1806. <https://doi.org/10.31539/2jagyn29>
- Hughen, L. (2026). The Influence of Derivatives on Audit and Financial Reporting Risks. *Accounting and Auditing*, 2(1), 1–17. <https://doi.org/10.3390/accountaudit2010001>
- Ie, R., Linggadjaya, T., Dorkas, A., & Atahau, R. (2025). The Moderating Role of Capital Adequacy on Bank Specific Characteristics to Sustainable Growth : Evidence From Commercial Banks in Indonesia. *SAGE Open, September*, 1–21. <https://doi.org/10.1177/21582440251353042>
- Jainuri, M. R., & Kunaifi, A. (2026). Credit Risk Dynamics and Credit Quality in the Banking Sector and FMCG Industry : Bibliometric Study and Content Analysis. *Journal of Social Research*, 5(5), 1784–1793. <https://doi.org/10.55324/josr.v5i5.3125>
- Kara, A. (2016). Securitisation and banking risk : what do we know so far ? *Review of Behavioral Finance*, 8(1). <https://doi.org/10.1108/RBF-07-2014-0039>
- Maulana, A., Murdhaningsih, & Luthfi, F. (2025). Financial risk management , capital adequacy , and stability of Islamic banks : The moderating effect of efficiency in the Indonesian and Malaysian context. *Banks and Bank Systems*. [https://doi.org/10.21511/bbs.20\(3\).2025.18](https://doi.org/10.21511/bbs.20(3).2025.18)
- Munthe, S. A. P., Pane, S. G., & Nasution, L. N. (2025). Dynamic Analysis of Non-Performing Loans in Indonesian Banking. *International Journal of Economics and Management Sciences*, 0965. <https://doi.org/10.61132/ijems.v2i4.976>
- Murtiningrum, W., & Wahyuningsih, E. (2024). Analysis of the Effect of Financial Ratios on ROA at Commercial Banks on the IDX. *Asean International Journal of Business*, 3(1), 12–19. <https://doi.org/10.54099/aijb.v3i1.470>
- Pradigdo, A. C., Albart, N., & Huda, N. (2025). Systematic Literature Review: CAR, LDR, NIM and NPL on Banking Profitability in Indonesia. *Jurnal Bisnis, Manajemen Dan Perbankan*, 11(02), 372–386. <https://doi.org/10.21070/jbmp.v11i2.2112>

- Prashanth, B. S., Kumar, M., Hoque, A., Al, N., Azaad, I., Christian, U., & Rao, A. (2026). Prediction of bank transaction fraud using TabNet — an adaptive deep learning architecture. *International Review of Economics and Finance*, 106(January), 1–27. <https://doi.org/10.1016/j.iref.2026.104916>
- Rizkison., Susilawati, N., Munawarah, I., & Septria, F. (2025). Analisis Mendalam Non-Performing Loan (NPL) Bank Umum Konvensional Dilihat dari CAR, LDR, ROA, dan BOPO yang Terdaftar di Bursa Efek Indonesia (BEI). *Jurnal Keuangan Dan Bisnis*, 17(1), 92–99. <https://doi.org/10.58890/jkb.v17i1.390>
- Segal, M. (2025). Modelling CSRBB under regulatory guidelines. *Finance Research Letters*, 82(February), 107501. <https://doi.org/10.1016/j.frl.2025.107501>
- Wosko, Z. (2025). Is Credit Spread Risk Modellable ? Understanding CSRBB Modelling in Banks. *Financial Sciences*, 30(2). <https://doi.org/10.15611/fns.2025.2.04>
- Wu, Z., Yang, B., & Su, Y. (2022). Liquidity , Credit Risk , and Their Interaction on the Spreads in China ' s Corporate Bond Market. *Discrete Dynamics in Nature and Society The*, 2022. <https://doi.org/10.1155/2022/2996704>
- Yi, J. (2014). Treasury Bills and Central Bank Bills for Monetary Policy. *Procedia - Social and Behavioral Sciences*, 109, 1256–1260. <https://doi.org/10.1016/j.sbspro.2013.12.622>
- Zhang, Q., & Wu, M. (2011). Credit Risk Mitigation Based on Jarrow-Turnbull Model. *Systems Engineering Procedia*, 2(106), 49–59. <https://doi.org/10.1016/j.sepro.2011.10.007>

RESPOND FORM

AUTHORS ARE REQUIRED TO RESPOND to all comments from the Reviewer and Editor. Authors must indicate in the revised manuscript the sections that have been revised.

Reviewer A

No	Comments	Respond
1	Clarify the operationalization of the variables. The authors are encouraged to provide more detail regarding the measurement of CSRBB, treasury stability, duration, and audit to improve the transparency and reproducibility of the study.	The manuscript has been revised to clarify the operationalization of Treasury Stability, CSRBB, Duration, and Audit, including their measurement basis, units, and data sources. CSRBB is defined as a scaled index derived from market-risk information disclosed in annual reports and market-risk disclosures, Duration is expressed in years based on relevant treasury and market-risk disclosures, Treasury Stability is measured using NIM for conventional banks and NSM for BSI, and Audit is measured by the annual number of Audit Committee meetings. Revision made: Research Methods – Variable Measurement and Operationalization, Table 1
2	Strengthen the discussion of model differences. The difference between the pooled OLS and fixed-effects results is an interesting finding. The discussion could further emphasize how bank-specific characteristics may explain the change in the CSRBB coefficient across estimation approaches.	The Results and Discussion section has been revised to explain the difference between the pooled OLS and fixed-effects results. The pooled OLS model reports a CSRBB coefficient of -4.179 ($p = 0.003$), whereas the fixed-effects model reports 0.320 ($p = 0.714$). The revised discussion explains that the negative empirical association identified in the pooled specification is not statistically significant after controlling for bank-specific, time-invariant characteristics, and therefore the evidence for H1 is model-dependent. Revision made: Results and Discussion – Pooled OLS and Fixed Effect Model Results.
3	Improve the explanation of the audit moderation result. The insignificant interaction between CSRBB and audit should be discussed in relation to the limited variation in the audit measure and the characteristics of the sampled banks, rather than interpreted solely as evidence that audit mechanisms are ineffective.	The moderation analysis has been revised to clarify that the CSRBB $\times$ Audit interaction is statistically insignificant ($\beta = 0.025$; $p = 0.879$). The discussion relates this finding to the characteristics of the dataset, consisting of 20 observations from four banks over five years, and the observed Audit range of 21–32 meetings per year, without interpreting the result as evidence that audit mechanisms are ineffective. Revision made: Results and Discussion – Moderated Regression Analysis.
4	Refine presentation and statistical consistency. The authors should conduct a final consistency check of the reported coefficients, signs, statistical significance, and corresponding interpretations, particularly in the pooled OLS results and the discussion of CSRBB.	A consistency check has been conducted across the regression tables and related discussion. The pooled OLS CSRBB coefficient is consistently reported as -4.179 ($t = -3.463$; $p = 0.003$), while the fixed-effects coefficient is 0.320 ($p = 0.714$) and the CSRBB $\times$ Audit interaction is 0.025 ($p = 0.879$). The corresponding interpretations have been aligned throughout the manuscript. Revision made: Results and Discussion, Tables 3–5, and Conclusion.

Reviewer B

No	Comments	Respond
1	Clarify the measurement of CSRBB and Treasury Stability. The manuscript should provide a more detailed explanation of how CSRBB, treasury stability, duration, and audit are operationalized, including the specific formulas, data sources, and measurement units. This is particularly important because CSRBB is a relatively specialized risk measure.	The manuscript has been revised to provide clearer operational definitions, measurement units, and data sources for CSRBB, Treasury Stability, Duration, and Audit. CSRBB is represented by a scaled index derived from market-risk disclosures, Treasury Stability is measured using NIM for conventional banks and NSM for BSI, Duration is expressed in years, and Audit is measured by the annual number of Audit Committee meetings. Revision made: Research Methods – Variable Measurement and Operationalization, Table 1.

No	Comments	Respond
2	Address the very small sample size. The analysis covers only four banks over five years, resulting in a very limited number of observations. The authors should explicitly discuss the implications of this sample size for statistical power, estimation reliability, and generalizability of the findings.	The manuscript now explicitly discusses the implications of the sample size of 20 observations, consisting of four banks observed over five years from 2021–2025. The discussion acknowledges the limited statistical power and estimation precision associated with the sample size and restricts the interpretation and generalizability of the findings to the sampled banks and observation period. Revision made: Results and Discussion – Sample Characteristics and Regression Results.
3	Reconcile inconsistencies in the regression results. Several statements in the results section appear inconsistent with the reported coefficients. For example, the pooled OLS table reports a positive CSRBB coefficient (4.179), while the discussion interprets it as a negative effect. The authors should carefully verify the regression tables, coefficient signs, and corresponding interpretations throughout the manuscript.	The inconsistency in the pooled OLS CSRBB coefficient has been corrected. The previous positive value of 4.179 was a sign error; the verified coefficient is -4.179 , with $t = -3.463$ and $p = 0.003$. Table 3 and the corresponding discussion have been revised so that the coefficient sign and interpretation are consistent throughout the manuscript. Revision made: Results and Discussion – Table 3 and related discussion.
4	Strengthen the discussion of the fixed-effects findings. Since CSRBB becomes statistically insignificant after controlling for bank-specific effects, the discussion should emphasize that the evidence for H1 is model-dependent rather than presenting CSRBB as a robust determinant of treasury stability. The implications of this difference between pooled OLS and FEM should be discussed more carefully.	The discussion of H1 has been revised to emphasize that the empirical evidence is model-dependent. CSRBB is statistically significant in the pooled OLS specification ($\beta = -4.179$; $p = 0.003$), but statistically insignificant in the fixed-effects specification ($\beta = 0.320$; $p = 0.714$). The revised manuscript therefore distinguishes the pooled and fixed-effects findings rather than presenting CSRBB as a statistically significant relationship across estimation specifications. Revision made: Results and Discussion – Pooled OLS, Fixed Effect Model, H1 Discussion, and Conclusion.

Editor

No	Comment	Respond
1	The authors are requested to revise the manuscript according to the reviewers' suggestions, improve its overall academic quality and clarity, and ensure compliance with the journal's official template and author guidelines. To enhance the manuscript's international visibility and reach, the authors are also encouraged to consider adding a relevant international author/researcher, where appropriate.	The manuscript has been revised according to the Reviewers' comments and checked for compliance with the journal template and author guidelines, including the manuscript structure, tables, equations, references, and consistency of presentation. Regarding the suggestion to consider an international author/researcher, the current author team has been retained, while relevant international literature has been incorporated to strengthen the academic context of the study.