MODERATING ROLE OF FOREIGN BANK PENETRATION IN BANK COMPETITION, CAR, LDR AND CREDIT RISK

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Abstract. This study aims to analyze the influence of interbank competition, Capital Adequacy Ratio (CAR), and Loan to Deposit Ratio (LDR) on credit risk in national commercial banks in Indonesia during the period 2019-2023, as well as to examine the moderating role of foreign bank penetration in these relationships. The data used are secondary data obtained from the financial statements of banks listed on the Indonesia Stock Exchange (IDX). This research adopts a quantitative approach using Moderated Regression Analysis (MRA). The results show that bank competition and CAR have a significant effect on credit risk, while LDR does not exhibit a significant effect. However, foreign bank penetration is found to moderate the relationship between LDR and credit risk. These findings offer important implications: the higher the loan disbursement (high LDR), the greater the potential for non-performing loans. Therefore, bank management should formulate liquidity strategies that balance fund mobilization and loan disbursement, while maintaining a liquidity buffer to anticipate fluctuations in credit demand and potential defaults.
Keywords: *foreign bank penetration, credit risk, bank competition, Capital Adequacy Ratio (CAR), Loan to Deposit Ratio (LDR)*

Introduction

The stability of the banking sector is one of the key pillars in maintaining the overall stability of the national financial system. Credit risk is among the primary risks faced by banks, as it can directly affect profitability, liquidity, and the overall resilience of the banking industry. According to the Financial Services Authority Regulation (OJK Regulation) No. 15/POJK.03/2017 concerning the Determination of Bank Status and Follow-up Supervision of Commercial Banks, a bank's lending activity is considered problematic if the net Non-Performing Loan (NPL) ratio exceeds 5% of the total loan portfolio. *Table 1* presents the credit risk levels of banks for the period 2019–2023, expressed in percentages (%). The data indicate that several banks experienced fluctuating levels of credit risk, with some banks showing significant increases or decreases from year to year. In 2019, Bank IBK Indonesia recorded the highest credit risk at 11.68%, followed by Bank Sinarmas at 8.00%, Bank Victoria at 6.57%, and Bank Pembangunan at 5.01%. In 2020, Bank Pembangunan experienced a significant surge, registering the highest credit risk at 22.27%. Other banks, such as Bank KB Bukopin, also saw an increase to 10.13%, while Bank Victoria recorded 7.35% and Bank of India Indonesia reached 4.88%. In 2021, Bank Pembangunan remained the highest with a credit risk level of 14.09%, followed by Bank KB Bukopin at a still elevated level of 11.16%. Notably, Bank of India Indonesia experienced a sharp increase in credit risk, reaching 8.95%, making it the highest among other banks that year. In 2022, although Bank Pembangunan continued to have the highest credit risk at 9.45%, it showed a decline from the previous year. Similarly, Bank KB Bukopin's risk

level decreased to 6.63%. In contrast, Bank Sinarmas saw a significant rise in credit risk, reaching 8.16%.

***Table 1**. Bank credit risk level for the period 2019-2023 in (%).*

No	Code bank	2019	2020	2021	2022	2023
1	AGRO	1,34	0,56	0,35	2,90	4,40
2	AGRS	11,68	5,14	2,07	1,99	1,48
3	AMAR	4,49	6,93	0,03	0,03	9,17
4	ARTO	2,06	0,00	0,56	1,81	0,84
5	BABP	5,78	5,69	4,42	3,51	3,92
6	BACA	3,48	0,00	0,00	0,10	0,07
7	BANK	2,66	3,22	3,00	2,44	2,38
8	BBCA	1,29	1,73	2,09	1,65	1,73
9	BBHI	3,93	2,76	0,52	0,01	0,08
10	BBKP	5,97	10,13	11,16	6,63	9,13
11	BBMD	2,26	1,69	1,18	1,26	1,37
12	BBNI	2,25	4,08	3,58	2,72	2,08
13	BBRI	1,26	1,24	1,74	1,84	2,18
14	BBSI	1,45	4,22	0,53	1,84	4,23
15	BBTN	4,78	4,37	3,70	3,38	3,01
16	BBYB	4,32	4,05	1,75	2,56	3,73
17	BCIC	1,49	4,97	3,90	1,80	1,03
18	BDMN	2,47	2,33	2,29	2,26	1,77
19	BEKS	5,01	22,27	14,09	9,45	9,36
20	BGTG	2,28	5,49	5,13	2,01	1,62
21	BINA	4,76	1,43	2,62	1,72	3,44
22	BJBR	1,73	1,66	1,45	1,34	1,60
23	BJTM	2,77	4,00	4,48	2,83	2,49
24	BKSW	4,45	1,21	0,04	0,08	0,09
25	BMAS	0,29	2,63	0,71	2,26	0,00
26	BMRI	2,36	2,96	2,61	1,86	1,16
27	BNBA	1,53	2,63	3,04	2,78	2,63
28	BNGA	2,75	3,53	3,42	2,78	1,95
29	BNII	3,08	3,65	3,59	3,34	2,80
30	BNLI	0,74	2,81	3,18	3,11	2,87
31	BRIS	5,28	3,03	2,87	2,41	2,09
32	BSIM	8,00	4,85	4,74	8,16	1,54
33	BSWD	4,22	4,88	8,95	4,55	6,28
34	BTPN	0,81	1,21	1,68	1,42	1,27
35	BTPS	1,35	1,89	2,34	2,62	2,89
36	BVIC	6,57	7,35	7,39	4,23	3,99
37	DNAR	2,60	2,16	2,55	1,82	1,59
38	INPC	5,71	4,58	3,39	2,72	1,74
39	MASB	4,15	3,66	2,48	3,09	1,48
40	MAYA	4,98	4,09	3,92	4,69	3,76
41	MCOR	2,62	2,94	4,39	3,40	2,87
42	MEGA	2,46	1,39	1,12	1,22	1,57
43	NISP	1,71	1,92	2,35	2,39	1,62
44	NOBU	2,09	0,21	0,58	0,41	0,59
45	PNBN	0,67	2,80	3,40	3,39	2,87
46	PNBS	3,48	3,48	0,94	3,34	3,84
47	SDRA	1,64	1,11	0,93	1,05	1,25
Rata-rata		3,26	3,59	3,00	2,62	2,64
Nilai Maksimal		11,68	22,27	14,09	9,45	9,36
Nilai Minimal		0,29	0,00	0,00	0,01	0,00

In 2023, Bank Amar Indonesia registered the highest credit risk at 9.17%, followed closely by Bank Pembangunan at 9.36%. Bank of India Indonesia again showed a high level of credit risk at 6.28%, while Bank Panin Dubai and Bank Victoria recorded 3.84% and 3.99%, respectively; both remaining within the safe threshold of 5% as set by Bank Indonesia and the Financial Services Authority (OJK). The penetration of foreign banks, measured as a percentage, showed a gradual decline from 2019 to 2023 (*Figure 1*). In 2019, the penetration rate stood at 13.21%, which decreased to 10.94% by 2023. This indicates that the proportion of foreign bank assets relative to the total banking sector assets declined, despite the nominal increase in foreign bank assets each

year. These data reflect the continued dominance of domestic banks in terms of total assets compared to foreign banks, with the share of foreign banks consistently decreasing relative to national banking assets over the past five years. This trend may suggest faster growth in the domestic banking sector.

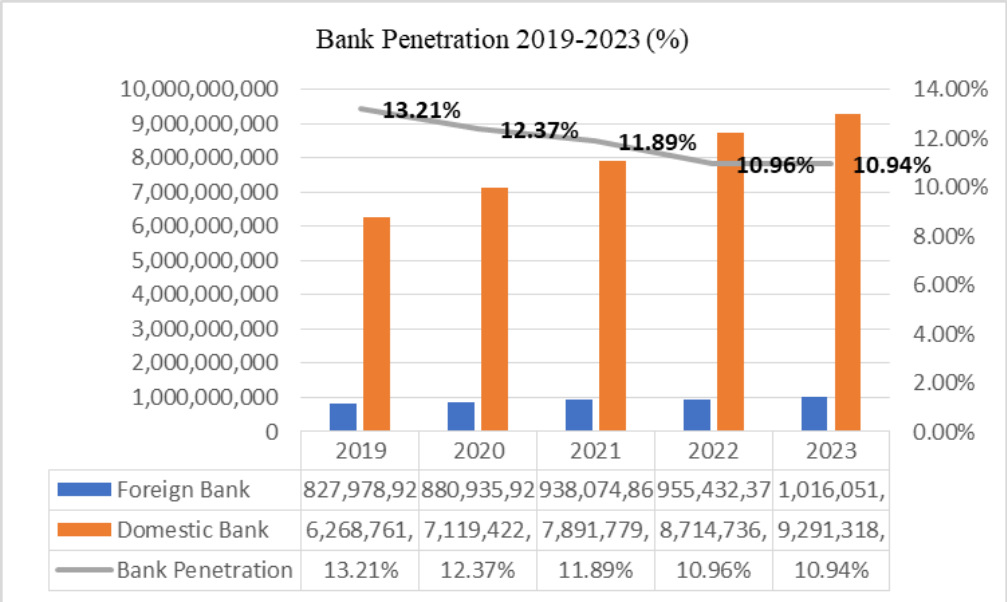

Figure 1. *Bank penetration 2019-2023 (in %).*

Literature review

Foreign bank penetration

Foreign bank penetration can have both positive and negative effects on bank competition and efficiency in host countries. The impact of foreign bank penetration on the level of banking competition remains controversial, with most findings suggesting that competition tends to increase alongside higher levels of foreign bank penetration (Usman et al., 2018; Chen et al., 2017). In this study, foreign bank penetration is proposed as a moderating variable, based on the hypothesis that the presence of foreign banks enhances competition in a country, which in turn alters the behavior and performance of domestic banks. Foreign bank penetration can be measured by calculating the total assets or the number of foreign banks operating in the market.

$$\frac{Total\ Assets/Number\ of\ Foreign\ Bank}{Total\ Assets/Number\ of\ Domestic\ Bank} x100\% \qquad \text{Eq. (1)}$$

Bank comoetition

Bank competition refers to the level of rivalry among banks in offering financial products and services to consumers and businesses. This study measures banking competition using the Lerner Index. The Lerner Index is a measure of a bank's market power, defined as the ratio of mark-up to price. It is expected to be zero under perfect competition but increases as the banking market becomes less competitive. According to Dilvin and Yeşilova (2019) as well as Hawtrey and Liang (2008), the Lerner Index, characterized as the negative inverse of demand elasticity, is used as a proxy for market power. A high Lerner Index indicates a strong degree of monopoly power in the

banking market, while in highly competitive markets, banks have less capacity to set high margins, resulting in a lower Lerner Index. The index is calculated as the difference between price and average cost, divided by price, serving as a proxy for the Lerner Index. The computation of the Lerner Index is described where TR refers to Total Revenue and TC denotes Total Cost.

$$Lerner\ Index_{i,t} = \frac{(TR-TC)}{TR} X100\% \quad \text{Eq. (2)}$$

Capital Adequacy Ratio (CAR)

The Capital Adequacy Ratio (CAR) is a financial metric used to assess a bank's capital sufficiency in managing financial and operational risks. This ratio reflects the extent to which a bank's capital can absorb potential losses without jeopardizing its operational continuity, thereby protecting depositors' interests and ensuring the stability of the banking system. A bank's capital consists of Tier 1 Capital (core capital), such as common equity and retained earnings, and Tier 2 Capital (supplementary capital), including subordinated debt and revaluation reserves, along with Risk-Weighted Assets (RWA). The CAR is calculated using Eq. (3):

$$\frac{Modal\ (Tier\ 1+Tier\ 2)}{ATMR} x\ 100\% \quad \text{Eq. (3)}$$

Loan to Deposit Ratio (LDR)

The Loan to Deposit Ratio (LDR) represents the percentage of loans granted by a bank relative to the amount of deposits received from its customers. This ratio is crucial in assessing how effectively a bank manages its funds and in evaluating the bank's liquidity risk. Many institutions mistakenly interpret their specific excess liquidity position as effective liquidity management (Lins et al., 2010). Furthermore, they state that the Deposit to Asset Ratio examines whether banks with higher deposits incur additional operational costs to attract savings. In the context of bank risk, the deposit-to-asset ratio measures the relative proportion of total risk-weighted assets funded by deposits and provides a precise analysis of the role of deposits as a source of funding (Ofori-Sasu et al, 2019).

Credit risk

Credit risk refers to the possibility of default by a borrower on the loan granted by a bank. Credit risk is measured using the Non-Performing Loan (NPL) ratio. NPL is an indicator of a bank's credit health, representing the percentage of non-performing loans relative to the total loans disbursed. A high NPL ratio can lead to losses for the bank due to an increase in non-performing loans, which may reduce profitability and financial stability. Therefore, banks must implement sound risk management practices, including conducting stringent credit analysis, regularly monitoring loans, and applying restructuring strategies for borrowers facing financial difficulties. Regulators such as Bank Indonesia and the Financial Services Authority (OJK) have set a safe threshold for NPL at 5% to ensure the banking sector remains healthy and continues to contribute optimally to economic growth. The formula for calculating Credit Risk (NPL) is in Eq. (4):

$$\frac{Total\ kredit\ bermasalah}{Total\ kredit\ disalurkan}\ x\ 100\% \qquad \text{Eq. (4)}$$

Credit risk refers to the potential loss faced by banks as a result of borrowers' inability to meet their loan repayment obligations, which leads to the emergence of Non-Performing Loans (NPLs). NPLs have been associated with the 2007 Asian financial crisis and the collapse of financial markets. Consequently, NPLs have become a critical issue and remain an ongoing challenge for financial institutions (Endut et al., 2013). Understanding the relationship between bank competition and credit risk (NPLs) is increasingly important, particularly in the context of evolving economic dynamics. Given the exposure of banks to credit risk, various factors influence its occurrence, one of which is bank competition (Nuralyza et al., 2022). Competition within the banking industry plays a crucial role in determining the stability and efficiency of the financial system. Bank competition is one of the key elements that can affect bank performance, particularly in credit risk management. The relationship between bank competition and credit risk is explained by two competing theories: the competition–fragility theory and the competition-stability theory (Martinez-Miera and Repullo, 2010; Boyd and De Nicolo, 2005; Keeley, 1990). The competition–fragility theory suggests that higher competition increases banks' risk-taking behavior, thereby making them more vulnerable. In contrast, the competition–stability theory posits that greater competition in the banking sector leads to a more stable banking system and reduces systemic risk (Wibowo and Siantoro, 2018).

Usman et al. (2018) found that foreign bank penetration can enhance competition and efficiency among domestic banks in Indonesia, particularly for medium-to smaller-sized banks. However, a study by Lee et al. (2016), which examined the relationship between foreign bank penetration and bank competition in several Asian countries using a foreign ownership approach, produced mixed results and concluded that higher foreign ownership does not necessarily enhance bank competition. Pham and Nguyen (2020), in their study on the impact of foreign bank penetration on bank performance in Vietnam, supported the notion that the presence of foreign banks does not improve the performance of domestic banks. Yin (2021) found that in developed countries, foreign bank penetration increases competition, whereas in developing countries, it reduces competition. Moreover, economic cycles amplify the impact of foreign bank presence during crises. Natsir et al. (2019) also found that an increase in the number of foreign banks can reduce credit risk in emerging markets. The relationship between foreign bank penetration, competition, and credit risk depends largely on the level of competition and the income conditions of the host country (*Figure 2*).

H1: Bank competition has a significant effect on credit risk, as measured by non-performing loans (NPL)
H2: The capital adequacy ratio (CAR) has a significant effect on credit risk (NPL).
H3 : The loan-to-deposit ratio (LDR) has a significant effect on credit risk (NPL)
H4: Foreign bank penetration moderates the relationship between bank competition and credit risk (NPL)
H5: Foreign bank penetration moderates the relationship between the capital adequacy ratio (CAR) and credit risk (NPL)
H6: Foreign bank penetration moderates the relationship between the loan-to-deposit ratio LDR) and credit risk (NPL)

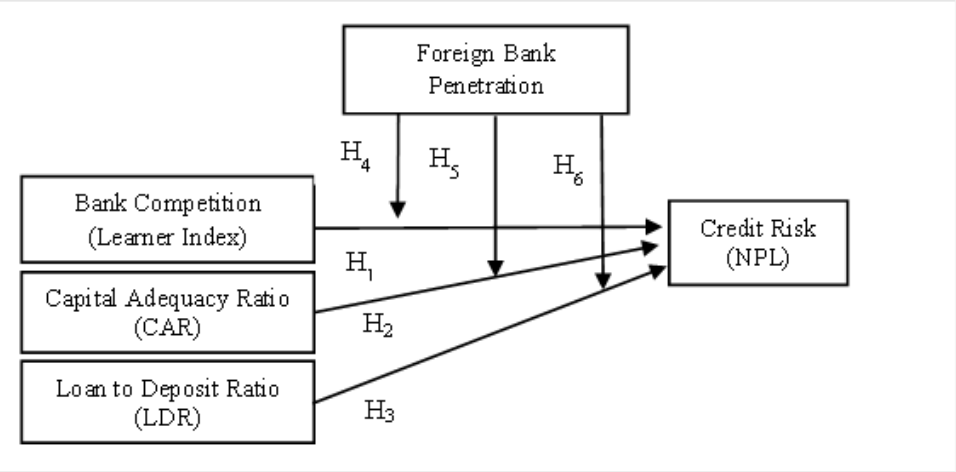

Figure 2. *Hypothesis model.*

Materials and Methods

This study employs a quantitative research design, in which the data are measurable and expressed in numerical form. An explanatory research approach is applied to examine the influence and relationships among variables, aiming to test the proposed hypotheses. The data collected include Bank Competition, Credit Risk (measured by Non-Performing Loans or NPLs), Foreign Bank Penetration, Capital Adequacy Ratio (CAR), and Loan to Deposit Ratio (LDR), all of which were obtained from banking companies listed on the Indonesia Stock Exchange (IDX). The population in this study consists of the financial reports of banking companies listed on the IDX. The sample comprises financial statements from 47 banking firms listed on the IDX for the period 2019–2023. To analyze the financial performance data of the banks, ratio analysis is employed. Financial ratios are used because they provide useful insights for business practitioners, government agencies, and other stakeholders in assessing a company's financial condition, including that of banking institutions. The analytical technique used in this study includes multiple linear regression and moderated regression analysis (MRA), processed using SPSS software. The two regression equations employed in this research are as follows:

Multiple linear regression:

$$NPLit = \alpha + \beta1LERNERit + \beta2CARit + \beta3LDRit + e \quad \text{Eq. (5)}$$

Regression moderation

$$NPLit = \alpha + \beta1LERNERit + \beta2PENEit + \beta1LERNER* PENEit + e \quad \text{Eq. (6)}$$

$$NPLit = \alpha + \beta2CARit + \beta2PENEit + \beta2CARit * PENEit + e \quad \text{Eq. (7)}$$

$$NPLit = \alpha + \beta3LDRit + \beta2PENEit + \beta3LDRit * PENEit + e \quad \text{Eq. (8)}$$

Where; α=regression equation constant; β1=lerner coefficient; β2=CAR coefficient.

Results and Discussion

Before conducting hypothesis testing, classical assumption tests were first performed to ensure that the data met the requirements for regression analysis. The results of the

classical assumption tests are presented in *Table 2*. Based on *Table 3*, the linear regression analysis examining the effect of bank competition on credit risk yielded a significance value (p-value) of 0.000. Since this p-value is less than the conventional threshold of 0.05, it can be concluded that bank competition has a statistically significant effect on credit risk, as measured by non-performing loans (NPLs). The linear regression analysis examining the effect of the Capital Adequacy Ratio (CAR) on credit risk yielded a significance value (p-value) of 0.000. Since this p-value is less than the conventional threshold of 0.05, it can be concluded that CAR has a statistically significant effect on credit risk, as measured by non-performing loans (NPLs). The linear regression analysis examining the effect of the Loan-to-Deposit Ratio (LDR) on credit risk yielded a significance value (p-value) of 0.084. Since this p-value exceeds the conventional threshold of 0.05, it can be concluded that LDR does not have a statistically significant effect on credit risk, as measured by non-performing loans (NPLs). The interaction term between bank competition and foreign bank penetration yielded a significance value (p-value) of 0.172. Since this p-value exceeds the conventional threshold of 0.05, it can be concluded that foreign bank penetration does not significantly moderate the relationship between bank competition and credit risk, as measured by non-performing loans (NPLs). Similarly, the interaction term between the Capital Adequacy Ratio (CAR) and foreign bank penetration produced a p-value of 0.641, which is also greater than 0.05. This indicates that foreign bank penetration does not significantly moderate the effect of CAR on credit risk. Conversely, the interaction between the Loan-to-Deposit Ratio (LDR) and foreign bank penetration resulted in a p-value of 0.035, which is below the 0.05 threshold. This suggests that foreign bank penetration significantly moderates the relationship between LDR and credit risk.

***Table 2**. Classical assumption test results.*

Classical assumption tests	BC	CAR	LDR	FBC	Conclusion
Normality Test	Using Kolmogorov-Smirnov Test *Asymp.sig* 2,00 > 0,05	Using Kolmogorov-Smirnov Test *Asymp.sig* 2,00 > 0,05	Using Kolmogorov-Smirnov Test *Asymp.sig* 2,00 > 0,05	Using Kolmogorov-Smirnov Test *Asymp.sig* 2,00 > 0,05	The data are normally distributed
Multicollinearity Test	VIF: 1,756 < 10	VIF: 1,168 < 10	VIF: 1,048 < 10	VIF: 1,783 < 10	There is no indication of multicollinearity
Heteroscedasticity Test	using Scatter Plot Graph Test	using Scatter Plot Graph Test	using Scatter Plot Graph Test	using Scatter Plot Graph Test	The distribution of points is random and there is no clear pattern, there is no indication of heteroscedasticity
Autocorrelation Test	DU < DW < 4-DU 1,794< 0,709 < 2,21434	DU < DW < 4-DU 1,794< 0,709 < 2,21434	DU < DW < 4-DU 1,794< 0,709 < 2,21434	DU < DW < 4-DU 1,794< 0,709 < 2,21434	There is no autocorrelation

***Table 3**. Summary of data processing results.*

Path	R^2	t-test	Significant
Bank Competition on NPL	99%	-101.29	0.000 < 0.05
Capital Adequacy Ratio on NPL	67%	-3.846	0.000 < 0.05
Loan to Deposit Ratio on NPL	14%	-1.734	0.084 < 0.05
Bank Competition and Foreign Bank Penetration on NPL	99.2%	1.37	0.172< 0.05
Capital Adequacy Ratio and Foreign Bank Penetration on NPL	99.2%	0.466	0.641< 0.05
Loan to Deposit Ratio and Foreign Bank Penetration on NPL	99.2%	2.119	0.035< 0.05

The impact of bank competition on credit risk is significant. The relationship between bank competition and credit risk (NPL) is becoming increasingly important to

understand, especially in the context of the ever-evolving economic dynamics. Given the credit risk faced by banks, there are several factors influencing credit risk, one of which is bank competition (Nuralyza et al., 2022). In the context of the Competition-Fragility theory, in a highly competitive environment, banks may be encouraged to loosen credit standards to attract customers, which can increase credit risk. Therefore, banks need to strengthen their credit risk management systems by implementing stricter credit assessments and intensive monitoring of their loan portfolios. Furthermore, in the context of the Competition-Stability theory, if competition drives efficiency and innovation, banks can better manage credit risk through product and service diversification and the application of technology to improve the accuracy of credit assessments. Banks must adjust their business models by offering products that meet market needs, such as digital banking services, to enhance competitiveness and effectively manage credit risk. Additionally, to attract customers, banks may lower interest rates, which can affect profit margins and credit risk. Banks need to balance competitive pricing strategies with prudent credit risk management (the systematic and disciplined application of cautionary principles throughout the credit origination, monitoring, and control processes). The goal is to maintain asset quality, minimize potential losses, and ensure the long-term financial stability of the bank. The impact of the Capital Adequacy Ratio (CAR) on credit risk is significant. This study is in line with Abid et al. (2014), who state that banks with a stronger CAR can implement successful measures to reduce default risk, contributing to a decrease in the Non-Performing Loan (NPL) ratio. CAR is an important indicator in assessing the bank's capital resilience against credit risk. In the context of the competition-fragility theory, increased competition among banks may encourage banks to lower credit standards in order to maintain market share, potentially increasing credit risk. In such situations, a high CAR becomes crucial as a buffer against potential losses from non-performing loans, as sufficient capital allows banks to absorb losses without jeopardizing operational stability. Conversely, according to the competition-stability theory, healthy competition promotes efficiency and innovation in banking practices, which can strengthen credit risk management. In this framework, a high CAR reflects the bank's commitment to conservative and stable banking practices and demonstrates its ability to effectively manage credit risk through strong capital.

The implication for the banking business is that optimal CAR management becomes a key strategy in facing the dynamics of competition. Banks need to balance credit expansion for business growth with maintaining an adequate CAR level to protect against credit risk. This includes strengthening core capital, diversifying the credit portfolio, and implementing stringent risk management practices. In doing so, banks can maintain financial stability while remaining competitive in the market. The effect of the Loan to Deposit Ratio (LDR) on credit risk is not significant. This study aligns with research conducted by Annas et al. (2024), which states that LDR does not influence the Non-Performing Loan (NPL) ratio. The Loan to Deposit Ratio (LDR) is an important indicator in assessing liquidity and the efficiency of fund distribution by banks. This ratio reflects the extent to which third-party funds are channeled into loans. In the context of the competition-fragility theory, increased competition among banks may encourage them to raise their LDR by aggressively disbursing loans to maintain market share. However, excessive lending without adequate risk analysis can increase credit risk, especially if the quality of borrowers is not well managed. This is consistent with findings that LDR has a positive and significant effect on credit risk, indicating that an

increase in LDR can raise exposure to non-performing loans. On the other hand, according to the competition-stability theory, healthy competition encourages banks to be more efficient and selective in their lending practices. In this framework, an increase in LDR reflects the bank's ability to manage funds optimally, extend credit to quality borrowers, and maintain financial stability. Therefore, a high LDR is not always synonymous with increased credit risk, depending on the quality of risk management applied by the bank. The implication for the banking business is the need for a balance between credit growth targets and prudent risk management. Banks must ensure that an increase in LDR is supported by comprehensive credit analysis, stringent portfolio monitoring, and compliance with liquidity regulations. With this strategy, banks can capitalize on growth opportunities in a competitive environment without compromising long-term financial stability. Foreign bank penetration does not moderate the effect of bank competition on credit risk. In the competition-fragility theory, increased competition among banks may encourage them to take higher risks to maintain market share, potentially increasing credit risk. However, studies by Siagian et al. (2024) as well as Nuralyza et al. (2022) indicate that the presence of foreign banks is not strong enough to alter this relationship; although foreign bank penetration may directly reduce credit risk, it is not capable of moderating the impact of competition on credit risk. In the context of the competition-stability theory, which asserts that competition can enhance financial stability through efficiency and innovation, the inability of foreign bank penetration to moderate the relationship between competition and credit risk suggests that the presence of foreign banks has not been significant enough to foster more stable banking practices in Indonesia.

Foreign bank penetration does not moderate the effect of the Capital Adequacy Ratio (CAR) on credit risk. CAR reflects the bank's capital resilience in facing potential losses, and the management of CAR is more influenced by the bank's internal policies and financial authority regulations, such as minimum capital requirements. In the framework of the competition-fragility theory, increased competition can drive banks to take higher risks to maintain market share, potentially increasing credit risk. Although a high CAR should act as a buffer against these risks, the presence of foreign banks does not significantly alter the relationship between CAR and credit risk. On the other hand, according to the competition-stability theory, healthy competition fosters efficiency and financial stability. However, the research findings indicate that foreign bank penetration has not been able to strengthen the role of CAR in reducing credit risk. This suggests that the presence of foreign banks has not been sufficiently significant in moderating the relationship between bank capital and credit risk in Indonesia. Foreign bank penetration moderates the relationship between the Loan to Deposit Ratio (LDR) and credit risk, where the presence of foreign banks weakens the negative effect of a high LDR on the increase in credit risk. This finding is consistent with research by Siagian et al. (2023), which found that although foreign bank penetration moderates the relationship between competition and credit risk, the presence of foreign banks still contributes to lowering credit risk levels in the Indonesian banking sector. Thus, in both theoretical frameworks, foreign bank penetration proves to be a stabilizing factor that helps maintain the quality of banking assets, especially amid high loan-to-deposit ratios.

In the framework of the competition-fragility theory, it is explained that increased competition due to the entry of new players (including foreign banks) may lead banks to undertake more aggressive credit expansion in order to maintain market share, ultimately increasing credit risk. The rise in the Loan to Deposit Ratio (LDR) reflects

this aggressiveness. However, the findings of this study indicate that the presence of foreign banks reduces the negative impact of LDR on credit risk. Foreign banks tend to be more conservative and selective in credit issuance, as well as having stricter governance practices. Therefore, within the context of this theory, foreign bank penetration acts as a stabilizing factor that mitigates the fragility effects induced by increased competition. According to the competition-stability theory, competition is viewed as a mechanism that drives efficiency and quality of intermediation. Banks operating in a competitive environment will be more cautious in extending credit to maintain their reputation and long-term sustainability. The findings of this study support this theory, as foreign bank penetration enhances the overall quality of the banking market. With the presence of foreign banks, domestic banks are encouraged to improve efficiency, strengthen risk management systems, and undergo digital transformation to remain competitive in a healthy manner. Therefore, the negative impact of a high LDR on credit risk is reduced.

Conclusion

Bank competition has a significant negative impact on credit risk. This can encourage banks to be more selective in extending credit and to improve operational efficiency. In a highly competitive environment, banks tend to lower loan interest rates to attract customers, thus reducing the interest burden on debtors. This enhances the ability of debtors to meet payment obligations, which in turn reduces credit risk. Additionally, competition also drives banks to improve risk management and credit selection processes, resulting in improved credit portfolio quality. Therefore, healthy competition between banks can strengthen the stability of the financial system through better credit risk management. The Capital Adequacy Ratio (CAR) has a significant negative impact on credit risk. A high CAR reflects a bank's sufficient capital to absorb credit risks. With strong capital, banks have a greater capacity to absorb potential losses from non-performing loans, thus reducing credit risk. Moreover, banks with high CARs tend to apply more conservative and selective risk management practices in extending credit, leading to better credit portfolio quality. This aligns with the principle of prudence in banking, where adequate capital strengthens a bank's resilience against credit risk. The Loan to Deposit Ratio (LDR) does not have a significant negative impact on credit risk. A high LDR indicates that banks are channeling a significant portion of third-party funds into credit, but this does not necessarily result in a significant increase in credit risk. This can occur if the bank has a good risk management system, such as stringent credit assessments, portfolio diversification, and ongoing monitoring of asset quality. Additionally, the quality of the credit extended is not only measured by its quantity, but also by the key factors determining credit risk. If credit is extended to debtors with low-risk profiles or secured by adequate collateral, the potential for non-performing loans can still be minimized even with a high LDR.

Foreign bank penetration does not moderate the effect of bank competition on credit risk. The presence of foreign banks has not been strong enough to significantly change the dynamics of competition in the domestic banking market. Foreign banks usually have more advanced technology, higher operational efficiency, and better risk management practices, yet their influence on the market structure remains limited because their market share is relatively small or they serve only specific segments such as large corporations or premium clients. Furthermore, domestic banks are more

familiar with local characteristics and have a broader network, which allows them to remain competitive without being disrupted by the presence of foreign banks. In this situation, competition between banks remains relatively stable, and the presence of foreign banks is not sufficient to strengthen or weaken the relationship between competition intensity and credit risk. Foreign bank penetration does not moderate the effect of CAR on credit risk. This is because the minimum capital requirements set by financial authorities apply universally to all banks, both domestic and foreign. Therefore, the role of CAR as an indicator of capital health and the bank's ability to absorb losses is strong enough on its own to influence credit risk. The presence of foreign banks does not necessarily alter this relationship, as the effect of CAR on credit risk is more dependent on the internal policies of the bank and compliance with regulations, rather than the ownership structure or the characteristics of competitors in the market. Furthermore, if foreign bank penetration is not quantitatively significant or focuses on specific segments, its impact on the overall national banking system is limited. As such, the presence of foreign banks is not strong enough to weaken or strengthen the effect of CAR on credit risk. Foreign bank penetration moderates the effect of LDR on credit risk. The presence of foreign banks can change how domestic banks respond to liquidity pressures and credit allocation strategies. Foreign banks generally have stricter risk management practices, more advanced technology, and access to more stable global funding sources. When foreign banks enter and compete in the domestic market, local banks are encouraged to improve efficiency and prudence in extending credit, especially when their LDR is high. In this context, a high LDR in domestic banks may not directly increase credit risk because they are driven to be more selective in credit issuance to remain competitive. In contrast, in markets dominated by domestic banks, a high LDR may be riskier due to looser internal oversight and competitive pressures. Therefore, foreign bank penetration can strengthen or alter the relationship between LDR and credit risk, making it a significant moderating factor.

The limitations of this study are confined to data from the period 2019-2023. The limited time frame may influence the research results, as changes in economic conditions and regulations may affect the relationship between foreign bank penetration, bank competition, Capital Adequacy Ratio (CAR), Loan to Deposit Ratio (LDR), and Credit Risk (NPL). This study focuses only on banking companies listed on the Indonesia Stock Exchange (IDX). Suggestions for future research could include the use of panel data covering more banks and a longer period, so that the dynamics of competition and foreign bank penetration can be more clearly observed, and to improve the generalizability of the findings. Future research is also recommended to explore other moderating variables that may be more relevant in influencing the relationship between internal and external factors of banks and credit risk, such as macroeconomic stability, the effectiveness of financial supervisory authorities, or the banking governance quality index. It is also suggested to add other control variables such as bank size, profitability (ROA/ROE), or operational efficiency (BOPO) to examine whether the insignificant relationships are influenced by other variables not yet included in the model.

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Conflict of interest

The authors have no conflicts of interest to declare.

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