Impact of financial inclusion and banking characteristics on banking stability in Indonesia

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Abstract

This study aims to examine the impact of financial inclusion and banking characteristics (bank size, Capital Adequacy Ratio (CAR), and Non-Performing Loans (NPL)) on the stability of the Indonesian banking sector from 2009 to 2019. The sample in this research comprises 22 banks in the BUKU 3 category and 7 banks in the BUKU 4 category. The data processing method employed is panel data analysis. The fixed effect model was selected as the most suitable model for this study. This research indicates that the financial inclusion variable significantly negatively impacts banking stability due to uneven access to financial inclusion and low financial literacy regarding banking products. Additionally, banking characteristics negatively influence banking stability through the NPL and bank size variables. In contrast, the CAR variable significantly positively affects the banking stability variable. Therefore, expanding financial access through financial education about utilizing and selecting financial service products that cater to the community's needs is essential. This will enhance the benefits of financial inclusion in society and subsequently positively affect banking stability in Indonesia.

INTRODUCTION

The global financial crisis of 2008-2009 caused turmoil for many banks and financial institutions. In response to the crisis, policymakers sought to reform the banking system to increase stability (Cihak et al., 2016). Financial inclusion emerged due to the financial crisis affecting the bottom-of-the-pyramid group, which is generally classified as the unbanked community. Financial inclusion represents easy access to banking services and technological advancements through efficient, low-cost payment mechanisms. In terms of access to finance in Indonesia, a World Bank Survey (2010) revealed that only 49% of Indonesian households have access to formal financial institutions. A Household Balance Sheet Survey (2011) showed that the percentage of households saving in formal or non-financial institutions is 48% (Departemen Pengembangan Akses Keuangan dan UMKM Bank Indonesia, 2014). In July 2012, Bank Indonesia collaborated with the National Team for the Acceleration of Poverty

Reduction (TP2PK) and the Fiscal Policy Agency of the Ministry of Finance to issue the National Strategy for Financial Inclusion (SNKI).

The current profile of financial inclusion in Indonesia is characterized by the increasing number of individuals accessing internet services. This growth is accompanied by a rise in the number of ATMs and bank service offices each year, as illustrated in Figure 1.
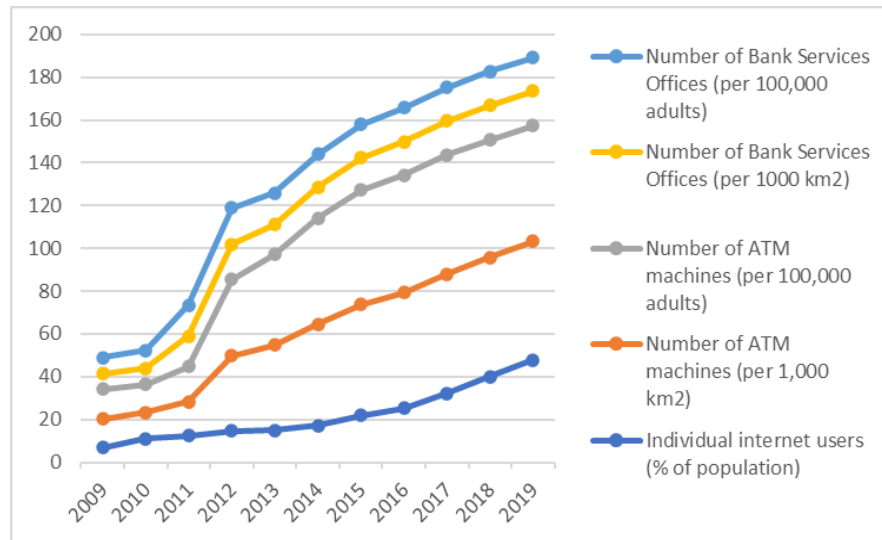
Source: Bank Indonesia (2020)
Figure 1. Digital technology development in Indonesia

Various innovative technological developments in the banking system, such as mobile and internet banking, facilitate the provision of banking services without a physical bank branch (branchless banking). Zahangir et al. (2013) show that mobile and internet banking can increase banking activities, accelerate financial transactions, and provide better financial services. Increasing the provision of digital infrastructure in remote areas and opening more financial literacy centers for the unbanked public can help fulfill the benefits of financial inclusion (Barik & Sharma, 2019). A high level of financial inclusion in banking contributes to bank stability; this can be observed in banks with many customers and high deposit levels but with low bank service fees, resulting in better stability for these banks (Ahamed & Mallick, 2019). Other studies propose that financial inclusion can lead to positive effects, such as improved household welfare resulting from easy access to finance for low-income groups. However, it may also have negative consequences if financial institutions fail to manage systemic risks, maintain financial stability, and promote financial inclusion effectively. (Amatus & Alireza, 2015). This is because when banks attempt to contain systemic risk, they may reduce financial service facilities for low-income groups.

In addition to the effects of financial inclusion, several pieces of literature state that individual bank characteristics can influence bank stability (Baselga-Pascual et al., 2015; Carreta et al., 2014; Chaibi & Ftiti, 2015; Karim et al., 2016; Nkusu, 2011; Shim, 2019). Several bank-specific factors, such as capital, bank size, and provision of credit reserves, are determinants of stability in banking institutions. Banks with good profitability levels generally have well-maintained stability. According to the market power hypothesis, a bank with a large market share and good product quality can use its market power to determine product prices and achieve above-average profits.

Furthermore, in the banking sector, large banks benefit from economies of scale and other advantages related to bank market share (Goddard et al., 2004). However, (Mishkin, 1999) argues that if a large, complex bank with a larger share is systematically situated within the country's economy, the bank may obtain government guarantees. Consequently, financial intermediary managers usually involve this type of bank in risk-taking activities, making them less stable. This is supported by research by Köhler (2014) and Odundo & Orwaru (2018).

The Capital Adequacy Ratio also reflects a bank's health. Menicucci & Paolucci (2016) state that a strong capital structure is essential for financial institutions because it adds resilience in dealing with financial crises and provides security for depositors during unstable economic conditions. Similarly, Bourke (1989) suggests that banks with high capital can enjoy access to cheaper sources of funds with minimal risk. In addition to mitigating risk to maintain stability, banks will set aside significant funds as a cushion to absorb credit losses. One of the most important steps is to create a Reserve for Impairment Losses (CKPN). Allowance for credit losses is an allowance for credit losses on credit portfolios and their funding that experience an economic decline (Budiarti, 2012). Therefore, providing credit losses is essential to reduce the risk of customers failing to meet their obligations to the bank. Beatty and Liao (2011) define CKPN as a policy followed by commercial banks by setting aside a specific amount of money (reserves) to deal with potential loan defaults, which will help protect the bank's position in profitability and capital.

This research differs from previous studies in several ways. Firstly, it uses micro variables to measure banking stability through financial inclusion and bank characteristics. This contrasts with Sakarombe's research (2019), which measures bank stability based on the level of financial inclusion and the influence of macroeconomic factors. Similarly, Ahamed and Mallick (2017) measure bank stability using a cross-country analysis based on bank, country-specific, and institutional characteristics across multiple countries. Secondly, the research focuses on Indonesia after the global crisis, with bank objects based on BUKU 3 and 4 categories during the 2009-2019 period. The more intensive development of the financial inclusion sector in Indonesia has facilitated people's access to financial services. Financial inclusion is also one of Bank Indonesia's strategies to increase the efficiency of the financial system, which, over time, will strengthen the security of the Indonesian financial industry and address potential risks that could impact financial system stability. Therefore, this study aims to analyze the effect of financial inclusion and banking characteristics on Indonesia's banking stability level.

METHODS

This study uses secondary data: banking financial reports from OJK websites, related bank annual publications, and BPS. The research hypothesis is tested by using panel data that combines time series data with the research period from 2009-2019. This was chosen because that was a recovery period after the global financial crisis in 2008-2009.

This study used cross-sectional data also, where cross-sectional units were measured at different times (Baltagi, 2008). The panel data analysis technique in the study was carried out using the common effect model, fixed effect model, and random effect model method (Jelanti, 2020). This study uses data from 29 banks in Indonesia

which are classified as BUKU 3 (Bangkon Comp, BNP Paribas, BPD West Java and Banten, BPD Central Java, BPD East Java, BTN, BTPN, Bukopin, City Bank, DBS Indonesia, Bank DKI, HSBC Indonesia, ICBC Indonesia, Bank Hanna, Mandiri Syariah, Bank Mayapada, Bank Mega, OCBC, Permata, Standard Bank, UOB Indonesia, Maybank) and BUKU 4 (BCA, BNI, BRI, CIMB Niaga, Danamon, Mandiri, Panin Bank).

BUKU 3 and BUKU 4 category banks were chosen for this study because they have a minimum core capital of 5 trillion rupiahs and can carry out all banking business activities, as mentioned in Articles 3 and 4 of the Financial Services Authority Regulation Number 6/POJK.03/2016. These banking activities can be in the form of rupiah or foreign currency. Additionally, they can participate in equity in financial institutions in Indonesia and/or overseas, which are limited to the Asian region for BUKU 3 Banks and in financial institutions in Indonesia and/or abroad with a wider reach than BUKU 3 for the BUKU 4 bank category (Otoritas Jasa Keuangan, 2016).

Based on two previous studies by Ahamed and Mallick (2017); Sakarombe (2019); Van et al. (2020), which test the hypothesis between financial inclusion, banking characteristics in the form of bank size, capital adequacy ratio, and allowance for impairment losses on banking stability in Indonesia from 2009 to 2019, this research uses the following basic model:

$$SB_{it} = \beta_0 + \beta_1 IKI_{it} + \beta_2 UB_{it} + \beta_3 CAR_{it} + \beta_4 CKPN_{it} + \mu \quad \dots\dots\dots\dots\dots\dots\dots\dots \text{(1)}$$

Where SB is banking stability represented by the value Z-score, IKI is a financial inclusion index. UB is a banking measure that is a scale for measuring the size of a bank by calculating the ratio of total assets, total capital, and total sales as a scale for measuring its size. CAR is a capital adequacy ratio that shows the extent to which a bank has the risk of each credit/Productive Assets, which is risky. CKPN is the ratio of loan provisions to total assets used to calculate the risk of lending to individuals.

Based on Sarma (2012), the model for measuring IKI first calculates the dimension index for the dimensions of financial inclusion. The steps used to calculate the value of the Financial Inclusion Index are as follows:

First, by calculating the value of each dimension index (di) for the dimensions of financial inclusion, using the equation:

$$d_i = w_i \frac{D_i - m_i}{M_i - m_i} \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\text{(2)}$$

Description :
  wi   : weight attached for i dimension
  Di   : true value (actual) i dimensions
  mi   : lower limit value of i dimension
  Mi   : upper limit value of i dimension

Equation (2) aims to ensure that $0 \leq di \leq wi$. The higher the value of di, the higher the bank's achievement. If the 3 dimensions of financial inclusion are taken into account, then the achievement of a bank in these dimensions will be represented by point X = (d1, d2, d3). In 3-dimensional space, point O = (0, 0, 0) represents the point that signifies the worst situation, while point W = (w1, w2, w3) indicates the ideal location. The location of the X achievement point compared to the worst point O and the ideal point W is an important factor in measuring a bank's financial inclusion level.

Therefore, to calculate IFI, we first compute X1 (distance between X and O) and X2 (inverse distance between X and W), and then take a simple average of X1 and X2 to calculate IFI. Finally, we calculate the index.

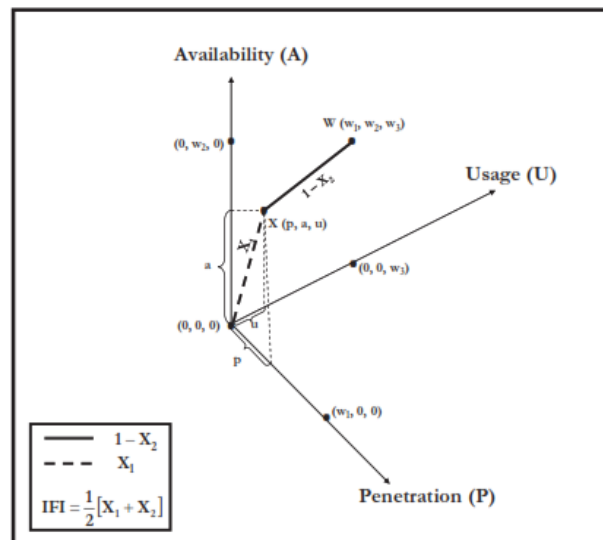**Second**, calculate X1 and X2, using the following equation

$$X_1 = \frac{\sqrt{d_1^2+d_2^2+d_3^2}}{\sqrt{(w_1^2+w_2^2+w_3^2)}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (3)$$

$$X_2 = 1 - \frac{\sqrt{(w_1-d_1)^2+(w_2-d_2)^2+(w_3-d_3)^2}}{\sqrt{(w_1^2+w_2^2+w_3^2)}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (4)$$

Third, determines the simple average values of X1 and X2, thus combining the distances from the worst and ideal points. By using the following equation:

$$IKI = \frac{1}{2}[X_1 + X_2] \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (5)$$

Figure 2 shows how financial inclusion occurs

Source: Sarma, (2012)
Figure 2. Graphical explanation of 3 dimensions of IKI

From the graphic explanation, IKI is equipped with three-dimensional assistance in accessibility or penetration, availability, and use of the financial system. Each of these dimensions is represented by an axis in three-dimensional space. Point W = (w1, w2, w3) represents the ideal point, and point X = (p, a, u) describes a bank's achievement in this dimension. Banks with an inclusive financial system must be closer to the ideal point W than less inclusive banks. Likewise, a bank with a more financially inclusive system has to be further away from point O than a less inclusive bank. In other words, the distance between points X and W and the farther the distance between X and O will show high financial inclusion in country X (Sarma, 2012).

From several stages to measure the IKI, it was found that all the weighted dimensions in this study were considered important for measuring the inclusiveness of the financial system so that heavily installed for all dimensions, the value is the same (wi = 1). Following the method Sarma (2012) and Azwar (2017) used, where all

dimensions have the same priority, they are weighted with a value of wi = 1 for all i. So that the ideal situation will be represented by the point W= (1, 1, 1) in 3-dimensional space, and the final formula for IKI is as follows:

$$IKI = \frac{1}{2}\left(\frac{\sqrt{d_1^2+d_2^2+d_3^2}}{\sqrt{3}} + \left(1 - \frac{\sqrt{(1-d_1)^2-(1-d_2)^2-(1-d_1)^2}}{\sqrt{3}}\right)\right) \dots\dots\dots\dots\dots\dots\dots\dots (6)$$

Description :
IKI   = Financial Inclusion Index
d1   = banking penetration (number of accounts per population aged 15 years and
           over)
d2   = availability of banking services (number of ATMs and number of offices
           branch of each bank)
d3   = use of financial services (volume of loans and deposits to the country's GDP)

RESULTS AND DISCUSSION

The calculation of bank stability based on the z-score values indicates that among the 29 banks in Indonesia (7 banks in the BUKU 4 category and 22 banks in the BUKU 3 category), the average (mean) z-score is 5.45, with the minimum value at -20.04, the maximum value at 49.79, and a standard deviation of 5.37 (Table 1). This study's Financial Inclusion Index variable has a mean value of 0.8044817%, the highest value at 0.9082437%, the lowest value of 0.5361027%, and a standard deviation of 0.0255862.

The Bank Size variable has a mean value of 18.40, with the lowest value at 14.29, the highest value at 24.99, and a standard deviation of 1.66. The Capital Adequacy Ratio (CAR) calculations reveal an average ratio (mean) of 20.99, the lowest ratio at 8.34, the highest ratio at 162.72, and a standard deviation of 13.23. The Non-Performing Loans (NPL) variable has a mean value of 1.98, which falls into the category of financing requiring special attention (5%), with the lowest value at 0 (indicating current financing, i.e., <1%), and the highest value at 8.61 (classified as less current financing, i.e., 15%), along with a standard deviation of 1.41. The percentage classification is based on PBI Number 13/26/PBI/2011 (Bank Indonesia, 2011).

Table 1. Descriptive statistics

Variable	n	Minimum	Maximum	Mean	Std. Dev
SB	319	-20.03829	49.78963	5.454968	5.36652
IKI	319	0.5361027	0.9082437	0.8044817	0.0255862
UB	319	14.29447	24.99799	18.40179	1.662755
CAR	319	8.34	162.72	20.99411	13.22696
CKPN	319	0	8.61	1.978245	1.406085

The model specification test employs the Chow test, which reveals a probability value of 0.0000 (as shown in Table 2). Since this value is smaller than the alpha level of 0.05, the null hypothesis (H0) is rejected, and the alternative hypothesis (H1) is accepted. Consequently, the fixed effect model is deemed more appropriate for this study than the common effect and fixed effect models.

Table 2. Chow test

Effect Test	Statistic	Df	Probability
Cross Section Chi-square	63.78	0,1966	0.0000

The Hausman test compares the random effect and fixed effect models. The best model for this research will be selected based on the comparison results. In Table 3, the chi-square value indicates that the random effect model is inefficient, with a chi-square value of 13.57. The Hausman test compares the probability of the chi-square value with the alpha value. Since the p-value is smaller than the alpha value (0.0088 < 0.05), the null hypothesis (H0) is rejected, signifying that the fixed effect model is the most suitable model to use in this study.

Table 3. Hausman test

Chi^2 (Hausman Statisic)	$Prob>chi^2$
13.57	0.0088

Information regarding the effect of the independent variables (Financial Inclusion Index (FII), Bank Size, Capital Adequacy Ratio (CAR), and Non-Performing Loans (NPL)) on the dependent variable, Banking Stability (BS), can be observed in Table 4.

An R-squared value of 0.7415 indicates that the contribution of all independent variables in explaining the dependent variable is 74.15%, while variables outside the research model account for 25.85%. Furthermore, the F-test regression results in the study demonstrate that the calculated F-value is greater than the F-table (63.78 > 2.76). Thus, it can be concluded that all independent variables in this study simultaneously influence the dependent variable used in the research model.

Utilizing the best-fixed effect model, the results of this study reveal that the FII variable has a negative and significant impact on banking stability in Indonesia at a 5% significance level. The FII variable has a t-statistic of -6.25, a probability value of 0.000, and a coefficient value of -61.18, indicating that with each increase in FII, there will be a 61.18% decrease in banking stability in Indonesia.

The Bank Size variable negatively and significantly impacts banking stability in Indonesia at a 10% significance level. This variable has a t-statistic of -1.69, a probability value of 0.093, and a coefficient value of -0.41, signifying that with every 1% increase in bank size, banking stability will decrease by 0.41%. The Capital Adequacy Ratio has a positive and significant effect on banking stability in Indonesia at a 5% significance level, with a coefficient of 0.12. This means that for each 1% increase in the capital adequacy ratio, banking stability will increase by 0.12%.

The Non-Performing Loans (NPL) variable negatively and significantly affects banking stability in Indonesia at a 5% significance level. The NPL coefficient from the regression results is -0.78, indicating that for each 1% increase in the allowance for impairment losses, the stability level will be reduced by 0.78%.

Table 4. Estimation of SB

Variable	Coefficient	t-Statistic	Probability
IKI	-0.611813	-6.25	0.000[*]
UB	-0.4180485	-1.69	0.093[***]
CAR	0.1224319	6.57	0.000[*]
CKPN	-0.7890188	-5.22	0.000[*]
Constant	61.35757	7.26	0.000[*]
R-squared	0.7415		
F.Statistik	63.78		
Prob F-Statistik	0.00000		

  *significant at $\alpha = 1\%$, ** significant at $\alpha = 5\%$, *** significant at $\alpha = 10\%$

This study demonstrates that financial inclusion negatively and significantly affects banking stability. This finding contradicts contemporary banking theory, which expands upon the theory of financial intermediation. Contemporary banking theory posits that commercial banks and financial intermediaries play a crucial role in the distribution of capital resources (Bhattacharya & Thakor, 1993). These financial intermediaries reduce transaction costs and play a vital economic role. Nowadays, financial intermediaries are widely used to address financial inclusion needs. Commercial banks operate branch networks to reduce the distance between customers and banking service providers, thereby enhancing banking performance efficiency and lowering costs for the financial services provided to their customers.

The negative relationship between financial inclusion and banking stability can be attributed to two factors. First, in terms of expanding access, the level of the financial inclusion index remains unevenly distributed across regions. Access to finance in urban areas (83.60%) is still higher than in rural areas (68.49%), and many Indonesian provinces have a financial inclusion index below the national average of 76.19% (Otoritas Jasa Keuangan, 2019). Provinces with an index above the national average should be encouraged to use financial products and services more to improve their welfare. Meanwhile, provinces with an index below the national average need to receive more financial education to optimize financial products and services tailored to their needs.

Second, the level of understanding among the Indonesian population regarding banking and its services is still low. Indonesians have four financial literacy levels: well-literate, sufficiently literate, less literate, and not literate. Only about 38 out of 100 Indonesians fall into the well-literate category. Individuals must understand financial institutions before knowing the products and services offered. The importance of comprehending financial service institutions lies in how people use financial products and services. Therefore, a balance between expanding access to financial inclusion and providing financial education is necessary. This notion is supported by research from the OCDE (2013), which emphasizes the importance of financial education in conjunction with access to financial inclusion. The Alliance for Financial Inclusion also asserts that financial literacy is an investment to achieve financial inclusion (Alliance for Financial Inclusion, 2016).

Moreover, numerous banking institutions have started to reduce the number of branch offices and ATMs due to digitization, even though the public still uses financial service institutions' offices and ATMs for financial transactions (OJK, 2016). The preference for traditional delivery channels over phone banking is due to limited internet infrastructure networks in various regions, especially areas outside Java (APJII). According to the Asian Development Bank (2016), digital financial services encompass the use of technology to provide financial services from providers to a wide range of consumers, including electronic money, mobile money, card payments, and protection against electronic transaction crimes.

Additionally, consumer protection efforts remain inadequate. The application of internet technology to banking products and services offers numerous benefits, such as the convenience of internet banking and mobile banking for customers to conduct transfers, account mutations, and payments (credit cards, insurance, telephone accounts, and electricity accounts). However, implementing these programs in Indonesian banks

is still highly vulnerable to criminal activities such as malware, hacking, and phishing. These issues reduce public interest in accessing financial services via internet banking, leading them to prefer traditional banking services. To maintain customer protection, the implementation of branchless banking programs should be accompanied by the development of innovative security systems that effectively combat and protect against electronic transaction crimes.

The findings of this study align with research by Khan (2011), which indicates that financial inclusion negatively impacts stability if strong regulations are lacking and credit standards are lowered to reach the unbankable community by reducing loan requirements. Dupas et al. (2012) argue that merely expanding access to reduce transaction costs and time without improving the quality of services will fail to achieve financial inclusion effectively, leading to instability. This occurs because many people are unaware of banking options and lack trust in banking services.

The findings related to the influence of bank size variables on banking stability are inconsistent with the hypothesis. Differences between the research results and the hypothesis can occur because BUKU 3 and BUKU 4 banks are categorized as large market-scale banks. Essentially, banks of various sizes face different challenges in the banking industry. Small banks are often perceived as less capable of surviving during a crisis but tend to be less vulnerable to risk. On the other hand, large banks are considered capable of weathering a crisis but are also more susceptible to risk. Banks in BUKU 3 and BUKU 4 categories have a higher business complexity than other BUKU category banks, as stated in Article 4 of the Financial Services Authority Regulation Number 6/POJK.03/2016. The wide range of financial services that the BUKU group can offer increases both business profits and the level of risk.

The results of this study also support Odundo and Orwaru's (2018) research, which found that bank size has a negative effect on the financial stability of commercial banks. This finding supports the "too big to fail" hypothesis, which postulates a negative relationship between bank size and financial stability due to government guarantees for large banks should they go bankrupt. Köhler's (2014) research on the effect of business models on bank stability in the EU banking sector similarly revealed a negative relationship between bank size and stability, meaning that smaller banks are more stable than larger ones.

In this study, the capital adequacy ratio variable positively influences banking stability, which aligns with the hypothesis. Torbira & Zaagha's (2016) study explains that a bank's capital adequacy ratio indicates the financial sector's solvency and is considered a safety valve to protect depositors, thus promoting stability and efficiency in the banking system and financial institutions. This research supports Rustendi's (2019) findings that banks with good capital adequacy have better financial stability, whereas banks with insufficient capital adequacy have unstable financial stability. Putu and Dewa (2015) state that the higher the CAR, the lower the risk of bank failure, as capital acts as a buffer for banks to handle losses and enables them to face intense competition.

Lastly, the allowance for impairment losses significantly negatively impacts banking stability. This study supports Pogorzelski's (2017) argument that the allowance for impairment losses is instrument banks use to anticipate losses that may arise from unpaid loans, with the amount determined by the level of credit risk. This reserve for

losses is charged to the bank's profit provisions, meaning that providing excess reserves reduces bank profits. Consequently, the bank's gross profit declines, affecting profitability and, ultimately, the bank's financial security and the stability of the national banking system. Ahamed & Mallick's research (2017) indicates that banks with good management and high capital have better stability than banks with higher allowances for impairment losses. Ahmad et al. (2014) findings are consistent, stating that the allowance for impairment losses is an essential factor influencing banking stability and profitability, with well-established banks expected to have lower levels of impairment loss.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The research related to the level of stability of banks in Indonesia, as measured by BUKU 3 and BUKU 4 Banks between 2009 and 2019, reveals that financial inclusion has a negative effect on banking stability in Indonesia. This occurs because the expansion of bank access has not been evenly distributed across all regions, and there is limited public knowledge about banking products and services. People must understand financial institutions before becoming familiar with the products and financial services provided. Therefore, expanding access to financial inclusion through financial education is essential. The allowance for impairment losses (CKPN) also negatively impacts bank stability, as banks with low CKPN values tend to have better stability conditions.

The capital adequacy ratio positively affects banking stability, where a bank with good capital adequacy will have stable financial stability. In contrast, a bank with insufficient capital adequacy will have unstable financial stability. Meanwhile, bank size has a negative effect on banking stability because BUKU 3 and BUKU 4 banks are banking groups with high business complexity compared to other BUKU category banks. The various types of financial services that this BUKU group can offer will increase business profits and the level of risk.

Thus, expanding banking access services through financial inclusion and digitalization is crucial, accompanied by providing education related to banking products and equitable infrastructure development. This will allow the wider community to access banking services easily.

Recommendations

The government and banking institutions need to collaborate on expanding banking service access in every region of Indonesia, along with adequate infrastructure development. They should also provide financial education on using and choosing financial products and services according to the community's needs. For further research, other BUKU bank categories can be added to strengthen the findings of the influence of bank size, capital adequacy ratio, and CKPN on bank stability.

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