



# Analysis of Capital Buffer and Revenue Diversification on Banking Stability wIn Indonesia

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**Abstract.** The research aims to analyze the relationship between Capital Buffer and Revenue Diversification affecting Banking Stability in Indonesia. The focus is on commercial banks from 2015 to 2022, involving 62 listed and non-listed commercial banks, excluding Sharia Banks and Regional Government Banks (BPD), with data collected from the Financial Services Authority's (OJK) website. In this study, the panel data regression method was used to analyze the influence of capital buffer and revenue diversification on banking stability in Indonesia. Banking stability is measured using Z-Score as the dependent variable, while Capital Buffer and Revenue Diversification are used as independent variables. The study also considers Macroeconomic Conditions and Bank Specifics as Control Variables, and Covid-19 as a dummy variable. Findings indicate that the capital buffer has a significant positive impact on bank stability in Indonesia, particularly for banks diversifying income into non-interest sources due to the volatility of their income. Having a sufficient capital buffer can enhance the confidence of both customers and investors in the bank's stability, thereby potentially improving its market value and financial performance. Results show that the diversification of non-interest income has the potential to enhance bank stability, especially for small banks, whereas larger banks benefit more from focusing on interest income. Experts are required to manage these trading products because specialized knowledge in specific types of loan products can lead to more specialized bank services. This specialization enables banks to charge higher margins, thereby reducing the risk of bank failure. This study also supports the implementation of strict capital requirements and the consolidation of small and medium-sized banks to improve stability of the banking industry.

**Keywords:** *Capital Buffer, Revenue Diversification, Bank Stability, Indonesian Banking.*

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# 1 INTRODUCTION

The financial crisis in Southeast Asia between 1997 and the mid-2000s surprised many people. Countries like Indonesia, Malaysia, and Thailand, which had been economically successful since the 1960s, suddenly faced a sharp economic downturn. The crisis began with the decline of the Thai Baht, which then spread to neighboring countries. Inflation and interest rates soared, while the central banking sector collapsed, worsening the situation. This phenomenon is known as the "twin crises" [1]. Banking regulation, including bank capital rules, became important for maintaining financial stability. According to [2], economic health is closely related to financial stability, emphasizing the need for a strong financial sector for a stable economy.

In December 2019, in Wuhan City, China, the novel coronavirus (COVID-19) was first identified and then spread worldwide. On March 11, 2020, the World Health Organization (WHO) declared a public health crisis and classified COVID-19 as a global pandemic [3]. Since the global financial crisis of 2008–2009, this pandemic has become the biggest threat to financial systems globally (GFC). The Asian Development Bank estimates that the pandemic will cost the global economy between \$5.8 trillion and \$8.8 trillion, or 6.4% to 9.7% of GDP (Park et al., 2020).

The function and role of banks are considerably crucial for a country's economy, necessitating stringent regulations to ensure that banks maintain good financial stability, particularly during crises. The COVID-19 pandemic emerged in late 2019, impacting the global economic crisis and resulting in a slowdown in aggregate demand, production, trade, and economic activities while causing an increase in unemployment. Financial institutions in nearly every country are increasingly concerned about the potential impact on economic growth. Based on the situation, it becomes imperative to periodically ensure bank soundness. The Z-Score is one parameter commonly used to measure stability, where higher Z-score values indicate better bank stability and vice versa.

The significance of bank capital is pivotal for the overall continuity of banking businesses, particularly during crises. The capital buffer policy within Basel III, emerging after the Global Financial Crisis in 2008, was re-evaluated during the health crisis triggered by the COVID pandemic. Banks tend to maintain a capital buffer exceeding regulatory minimums as protection against adverse financial impacts resulting from unforeseen fluctuations in asset returns [4]. However, on one side, excessive capital buffers tend to encourage high-risk banks to take on more risk [5].

The condition of the capital adequacy ratio of banks in Indonesia during the period from 2017 to 2020 is quite good, as indicated by a CAR ratio above 21%, while the minimum requirement set by the regulator is 8%. However, this condition does not directly translate to high financial stability for the banks, as indicated by the low Z-score in comparison to neighboring countries like Malaysia, Thailand, and the Philippines. Excessive capital buffers may also indicate that banks are not optimizing their capital utilization, thus potentially reducing efficiency. Therefore, understanding how capital buffers can impact bank stability is crucial.

Numerous researchers have conducted comprehensive investigations into the influence of capital buffers on banking stability using a variety of variable

combinations. Nevertheless, there remains an ongoing debate regarding whether there exists a positive correlation between capital buffers and bank stability. For instance, [6] have posited that according to capital buffer theory, an excessive augmentation of capital beyond what is required can diminish a bank's risk. In contrast, [7] in their study reveals an inverse 'U' shaped correlation between capital regulation and bank risk-taking, measured by the z- score. This indicates that banks initially tend to take less risk, but later tend to take greater risks as capital ratios increase. Higher capital requirements, regardless of whether banks are well-capitalized or under-capitalized, result in increased risk-taking at heightened levels.

Diversification is one of the strategies banks use to mitigate financial instability. Indonesia's banking sector is moving away from traditional interest-based earnings towards non-interest income, as indicated by the rising share of non-interest income from 2017 to 2020. It is important to explore how diversification strategies affect a bank's ability to address financial challenges, adapt to shifting market dynamics, and manage risks effectively.

The impact of revenue diversification on banking stability remains a subject of ongoing debate. For instance, [8] investigated the consequences of income diversification in African markets from 2000 to 2017. His research revealed that employing income diversification techniques could enhance bank stability during both typical periods and times of crisis. Conversely, [9] studied Australian banks from 2002 to 2014 and found that non-interest income poses a higher risk compared to interest income. Higher levels of non- interest income, indicating increased complexity and revenue volatility, contribute to an increase in bank risk and may result in decreased bank stability. Examining the relationship between capital buffer and revenue diversification on banking stability in the context of Indonesian banks is important for various reasons. First, Indonesian banking plays a significant role in the success of global banking. [10] report that Indonesian banks had the greatest return on equity (ROE) among Asian banks in 2014, with a rate of 20.3%. This indicates that Asian banks made a significant contribution to global banking profits after taxes, ranging from 46% to 49% throughout the period of 2010–2014. Second, because banking continues to rule the Indonesian financial industry, banks play a crucial systemic role in the country's economy. In terms of total assets in May 2021, the banking sector dominated approximately 78% of the financial industry in Indonesia. Third, compared to most Asian nations, Indonesia shows lower levels of financial deepening and intermediation but greater bank net interest margins [11].

The purpose of this study is to fill the gaps from existing studies related the banking system's stability, which are limited, with the majority focusing on non-interest income and banks' risk [12]; interest margin, market power, and diversification strategy [13]; and competition, capital buffer, financial inclusion, and bank size [14]. This study aims to contribute to literature by examining the effect of capital buffer and revenue diversification on banking stability in Indonesia. Considering the pandemic's economic effects, it is critical to understand these factors to promote stable and sustainable growth in Indonesia's banking industry. Furthermore, the results of this research can also serve as a foundation for banks to design more sustainable and long-term growth-oriented business strategies, especially how to implement income diversification to increase profitability and bank stability. This study can provide information for regulators

to create more effective banking sector regulations. They can use this to assist in recognizing possible systemic risks and appropriate counteraction. Additionally, by focusing on capital buffer and income diversification, this research can assist regulators in assessing how well banks are performing in maintaining bank stability.

## **2 LITERATURE REVIEW**

### **2.1 Banking Stability**

The Bank of Indonesia defines Financial System Stability (FSS) as a secure financial system that efficiently allocates funds and absorbs shocks, thus preventing disruptions to both real sector activities and the financial system itself. Similarly, the European Central Bank describes financial system stability as a state in which the financial system can absorb shocks and minimize obstacles during financial mediation processes.

A popular risk metric in the empirical banking literature to represent a bank's likelihood of insolvency is the Z-score. It is often credited to [15] and it is crucial for evaluating bank risk individually and the stability of the financial system. A high Z-score value indicates a low-risk bank and vice versa.

### **2.2 Capital Buffer and Banking Stability**

As a financial institution providing services, banks require capital. Capital in banks not only serves to meet regulatory banking requirements but also functions as a buffer against various risks and shocks anticipated in the future. Given the significance of capitalization for banks, Bank Indonesia, as the banking regulator, has issued regulations concerning the mandatory minimum capital requirements to be fulfilled by banks.

A minimum capital requirement of 8% of risk-weighted assets (RWA), which was established in Basel I, is imposed by Bank Indonesia for financial institutions. Over time, Basel underwent enhancements with the inception of Basel II, which emphasizes risk-based capital regulations, focusing on supervision and market discipline. Following Basel II, Basel III was introduced and has been adopted in developed economies' banking systems and has been enforced since 2019. Basel III capital regulations emphasize the need for banks to prepare buffers to navigate risks during economic crises, ensuring banking stability. Capitalization in banks aligns with the Capital Adequacy Ratio (CAR), serving as an indicator to gauge sufficient capital reserves supporting assets prone to risks. CAR represents the ratio of capital adequacy maintained by banks to cover operational necessities and mitigate various risks. Bank Indonesia, via Regulation No. 15/12/PBI/2013, and the Financial Services Authority (OJK) through Regulation No. 11/POJK.03/2016, have established the Mandatory Minimum Capital Adequacy Ratio for Commercial Banks, setting the minimum CAR value at 8%.

Banks maintain additional capital reserves beyond the required minimum set by regulations to serve as a buffer against negative financial outcomes resulting from unexpected fluctuations in asset returns. This capital buffer serves as a protective measure, reducing the potential costs arising from unexpected capital disruptions and challenges in obtaining additional funding [16]. Therefore, the

capital buffer is used to enhance the bank's capability to absorb potential risks related to credit growth to maintain bank stability. [17] argue that capital buffers can prevent excessive risk-taking by banks. This finding supports the "regulatory hypothesis," which proposes that regulators prompt banks with greater risk exposure to hold more capital. This is because banks holding riskier portfolios but not maintaining adequate reserves are at higher risk of falling below the minimum capital requirements [18].

Conversely, the "moral hazard hypothesis" suggests an inverse correlation between capital and risk. Under this hypothesis, banks may take advantage of fixed-rate deposit insurance schemes [19]. If all depositors are insured, banks with higher risk exposure might choose to maintain smaller capital buffers. It is argued by [10], there is a negative correlation between capital buffer and bank stability. A significant capital buffer could empower banks to handle potential short-term losses and might prompt them to take on excessive risks. This finding is supported by [5], who found that increasing the capital buffer does not always reduce risks; instead, it might lead to increased risk-taking.

***H<sub>1</sub>: Capital buffer has a positive influence on bank stability.***

### **2.3 Revenue Diversification and Banking Stability**

The trend of revenue diversification gained momentum in the 1990s as banks sought to mitigate income fluctuations by shifting towards fee-based financial products and services from credit and interest rate-exposed businesses like intermediary activities. This was believed to reduce earnings volatility. [14] explains that banks initially have the potential to broaden their revenue streams by offering fee-based services, trading revenue, and other non-interest activities. Nevertheless, diversification may have inherent risks as banks may enter domains where they lack the necessary experience, technology, and scale to effectively compete.

[20] found a positive correlation between revenue diversification and bank stability. As the banking industry becomes increasingly competitive, institutions drive strategic decisions to diversify. Income diversification can enhance bank stability in both normal and crisis conditions, thereby confirming the validity of "portfolio management theory."

On the other hand, [9] argue that diversification activities result in a decrease in banking stability. Banks tend to be riskier when they have lower revenue concentration and higher non-interest income, particularly larger banks that have surpassed the maximum efficient scale in terms of risk. Banks may engage in high-risk projects to maintain their profit margins amid competition with international banks and non-banking sectors.

***H<sub>2</sub>: Revenue diversification has a positive influence on bank stability.***

### **2.4 Capital Buffer moderate by Revenue Diversification and Banking Stability**

When banks diversify their income streams through various methods of revenue generation, they effectively reduce their reliance on a single income

source. This diversification diminishes their dependence on a sole revenue stream, thereby decreasing their susceptibility to fluctuations or disruptions in specific sectors or market conditions. Consequently, the bank's overall exposure to risk becomes more manageable. Moreover, amid economic downturns or challenging financial periods, income diversification assumes a pivotal role in aiding banks to safeguard their capital. With multiple income sources, banks have the potential to shield themselves from the adverse impacts of economic recessions or downturns. This strategy of diversification empowers banks to maintain their financial stability by ensuring a more consistent income flow, thereby contributing to the accumulation of capital reserves during periods of economic adversity [14]. Therefore, by examining the relationship between diversification and capital, this research will also investigate whether diversification can strengthen the relationship between capital buffer and bank stability.

**H3: Capital buffer moderating by revenue diversification has positive influence on bank stability.**

### 3 RESEARCH METHODS

#### 3.1 Data Source

The target population for this study comprises the commercial banking industry, which includes both local and foreign banks that operated in Indonesia from 2015 to 2022, involving 62 listed and non-listed commercial banks. Secondary data from annual financial reports were collected for analysis. Regional Development Banks (BPDs) and Islamic banks have been excluded due to the distinct customer segmentation of BPDs, as well as the unique approach to accounting for Islamic banks, which operate based on the foundational principles of Islamic Shariah. The data was processed and analyzed for a panel data model. The regression model applied either fixed effects or random effects, selected based on statistical tests evaluating the suitability of each approach. The choice was guided by diagnostic tests such as the Hausman test, Chow test, and Lagrange test.

#### 3.2 Research Model

Panel data is used in this research with Z-score for measurement of bank stability as a dependent variable. For a thorough analysis to understand data variability, this research categorizes banks based on their Core Capital and divides them into four categories as regulated in POJK number 12/POJK.03/2021, namely, KBMI 1: Core Capital up to six trillion rupiah, KBMI 2: Core Capital more than six trillion rupiahs up to fourteen trillion rupiahs, KBMI 3: Core Capital more than fourteen trillion rupiahs up to seventy trillion rupiah and KBMI 4: Core Capital is more than seventy trillion rupiah. Small banks are those classified within KBMI 1 and 2, while large banks are those classified in KBMI 3 and 4. There are six equations to be tested in this research as follows:

$$\begin{aligned} \text{Equation (1):} \quad & FS_{it} = \alpha + \\ & \beta_1 HHIREV_{it} + \\ & \beta_2 BUFF_{it} + \\ \text{Equation (2):} \quad & \beta_3 RBUFF_{it} + \varepsilon_{it} \end{aligned}$$

$$\begin{aligned} \text{Equation (3):} \quad & FS_{it} = \alpha + \\ & \beta_1 HHINON_{it} + \\ & \beta_2 BUFF_{it} + \varepsilon_{it} \end{aligned}$$

Equation (4):

$$\begin{aligned} \text{Equation (5):} \quad & FS_{it} = \alpha + \\ & \beta_1 HHIREV_{it} + \\ & \beta_2 BUFF_{it} + \\ & \beta_3 RBUFF_{it} + \varepsilon_{it} \end{aligned}$$

$$\begin{aligned} & FS_{it} = \alpha + \\ & \beta_1 HHINON_{it} + \\ & \beta_2 BUFF_{it} + \varepsilon_{it} \\ FS_{it} = & \alpha + \beta_1 HHIREV_{it} + \beta_2 BUFF_{it} + \beta_3 RBUFF_{it} + \beta_4 SIZE_{it} + \beta_5 GROWTH_{it} \\ & + \beta_6 LIQUIDITY_{it} + \beta_7 ROA_{it} + \beta_8 GDP_{it} + \beta_9 INFLATION_{it} + \\ & \beta_{10} COVID_{it} \\ & + \varepsilon_{it} \end{aligned}$$

Equation (6):

$$\begin{aligned} FS_{it} = & \alpha + \beta_1 HHINON_{it} + \beta_2 BUFF_{it} + \beta_3 SIZE_{it} + \beta_4 GROWTH_{it} + \\ & \beta_5 LIQUIDITY_{it} \\ & + \beta_6 ROA_{it} + \beta_7 GDP_{it} + \beta_8 INFLATION_{it} + \\ & \beta_9 COVID_{it} + \varepsilon_{it} \end{aligned}$$

Equations 1 and 2 represent models with revenue diversification and capital buffer as the independent variable while bank stability as dependent variable for banks with KBMI 1 and 2. Equations 3 and 4 represent banks with KBMI 3 and 4. Equations 5 and 6 represent all Indonesian commercial banks, with macroeconomic conditions and bank specifics are added as control variables, and Covid-19 is included as a dummy variable to produce a more robust and valid analysis by providing a clearer picture of the relationships between variables.

The subscript  $i$  indicates the bank and  $t$  indicates the time. FS for bank stability, HHIREV and HHINON for revenue diversification, BUFF for capital buffer, RBUFF for capital buffer moderated revenue diversification, SIZE for bank size, GROWTH for bank asset growth, LIQUIDITY for bank liquidity, ROA for bank return on asset, GDP for gross domestic product rate, INFLATION for inflation rate, COVID for COVID-19 pandemic.

### 3.3 Independent Variables Capital Buffer

(Abbas et al., 2021) classified banks into different categories depending on their capitalization status, using the Basel criteria. Banks with a risk-based capital ratio of 10% or higher fall into the "well-capitalized" category, while those with ratios between 8% and 10% are considered "adequately capitalized" banks. The ratio where risk-based capital is calculated as '(tier I + tier II) divided by total risk-weighted assets.

In Indonesia, the regulatory minimum requirement of capital ratio is set at 8% as mandated by Regulation No. 15/12 / PBI / 2013 of the Central Bank of Indonesia. The capital buffer refers to the gap between a bank's capital adequacy ratio and the minimum capital adequacy ratio mandated by the banking regulator. For instance, a bank may have a capital adequacy ratio (CAR) of 19% even though the banking regulator only requires a minimum CAR of 8%. As a result, the bank has an 11% capital buffer to account for future uncertainties.

#### Revenue Diversification

This study employs the same method as [14] to evaluate revenue diversification. The Herfindahl-Hirschman Index (HHI) measures a bank's revenue concentration. There are two primary types of bank revenue: interest income and non-interest income.

$$HHI = \frac{REV}{NETOP} = \frac{(NON)^2 + (NET)^2}{NETOP}$$

$$NETOP = NON + NET$$

- NON refers to revenue generated from non-interest income.
- NET represents net interest margin.
- NETOP represents net operating revenue.

A higher Herfindahl-Hirschman Index (HHI) number indicates a greater concentration of revenue, suggesting that the bank has less diversification. The highest possible value of this index is 1, indicating a bank that is exclusively concentrated on a single sector, whether it is traditional or non-traditional product sales. On the other hand, an index of 1/n represents a bank that is perfectly diversified. Moreover, the assessment of diversification within non-interest income can be carried out using the following formula:

$$HHI = \frac{(FEE)^2 + (TRD)^2 + (OTOP)^2}{NON}$$

- FEE represents income generated from commissions and fees.
- TRD represents income from trading activities.
- OTOP represents income from other non-interest income.



### 3.4 Dependent Variables Banking Stability

Banking Stability is measured by Z-score [21]. Higher values of Z-scores

(ADZP) represent lower possibilities of failure.

$$ADZP = ADZP_1 + ADZP_2 + \frac{\text{Average ROA} + \text{Average (Total Equities / Total Assets)}}{SDROA}$$

- The ZP-score (ADZP) comprises two additive components known as ADZP1 and ADZP2.
- ADZP1 assesses bank portfolio risk, while ADZP2 measures leverage risk.
- SDROA represents the standard deviation of the average return on assets.

### 3.5 Control Variables Bank Specific Factors

Bank specific factors, often known as internal factors, refer to the unique qualities of a bank that might have an impact on its performance. Internal decision makers, such as top management and the board of directors, have a significant impact on these determinants. The bank-specific factors examined in this study are outlined below:

**Bank Size** is determined by calculating the natural logarithm (Ln) of its total assets, as demonstrated in studies conducted by [22].

**Profitability** ratio known as Return on Assets (ROA) is employed to evaluate the capacity of a financial institution to generate profits (Aisyah et al., 2022). The formula used according to Bank Indonesia Regulation No. 13/1/PBI/2011 is as follows:

$$ROA = \frac{E + B + I + T}{Total Assets}$$

**Liquidity** is crucial for banks to handle deposit withdrawals and fulfill credit demand. Liquidity is the capacity of a bank to meet its financial commitments and obligations on time by keeping sufficient liquid assets and being able to quickly convert them into cash. The liquidity measurement approach is derived from the research conducted by [13].

$$Liquidity = \frac{Cash + Cash Equivalents}{Total Assets}$$

**Bank Growth**, according (Zaki et al., 2011), is a measure of a bank's expansion based on the accumulation of its assets over time. Generally, as assets increase, liabilities also increase, given that public funds are managed by banks. High Total Asset Growth banks are more vulnerable to financial difficulties due to their increased level of liabilities, which raises risk. The following formula measures bank growth:

$$Bank\ Growth = \frac{TA_t + TA_{t-1}}{TA_{t-1}}$$

**Macroeconomic factors** are a set of control variables that indicate the prevailing macroeconomic conditions in each country. The macroeconomic variables that are the focus of this study are gross domestic product (GDP) and inflation with the following formula :

$$GDP\ rate = \frac{(GDP_t + GDP_{t-1})}{GDP_{t-1}}$$

$$Inflation\ rate = \frac{(Inflation_t + Inflation_{t-1})}{Inflation_{t-1}}$$

## 4 RESULTS AND DISCUSSIONS

**Table 1. Descriptive Statistics**

	Mean	Median	Maximum	Minimum	Std. Dev	Observations
<b>FS</b>	33.79193	26.14802	207.8201	-0.690664	29.40984	496
<b>HHI_REV</b>	0.702306	0.693962	0.991060	0.500000	0.134452	496
<b>HHI_NON</b>	0.601263	0.550341	1.000000	0.333545	0.192240	496
<b>BUFF</b>	0.221932	0.152850	2.753800	0.013000	0.246500	496
<b>SIZE</b>	17.22523	16.96320	21.41268	13.11152	1.662883	496
<b>GROWTH</b>	0.157854	0.087881	4.648229	-0.397957	0.349339	496
<b>LIQUIDITY</b>	0.162339	0.146753	0.886116	0.034536	0.082546	496
<b>ROA</b>	0.007455	0.009668	0.047318	-0.195839	0.023111	496
<b>GDP</b>	-0.470835	-0.009370	0.433572	-2.792.802	1.014044	496
<b>INF</b>	0.066976	-0.139670	1.698718	-0.444969	0.635582	496

Table 1 presents the descriptive statistics for the sample data used in this study. The dependent variable, FS refers to financial stability as the measurement of bank stability shows the mean value of 33.79193 along with the highest value of 207.8201 and the lowest value of -0.690664. The highest and lowest values are beyond the reachable range of standard deviation value of -0.690664. This implies that Indonesian commercial banks have relatively good solvency as the mean is higher than 0 even though there is a high discrepancy within the study period. Specifically, Nobu Bank in 2015 possessed the highest value among other banks in the same year whereas the lowest value was possessed by Bank Rakyat Indonesia Agroniaga.

Revenue Diversification measurement comprises HHI\_REV and HHI\_NON. The mean of HHI\_REV of Indonesian commercial banks is 0.702306, which suggests that most of the Indonesian commercial banks are not perfectly diversifying their income and focus more on the source of interest income. The maximum and minimum of HHI\_REV show the value of 0.991060 and 0.500000, respectively. In addition, the descriptive statistics of HHI\_REV demonstrate that the number of HHI\_REV that deviates from the mean for the lowest and highest values is greater than the number of standard deviations, 0.134452. This concludes that there are some banks that prefer to either perfectly diversify their income or focus on their income sources.

The HHI\_NON statistical data show the mean of 0.601263 with the highest and lowest amount of 1.000000 and 0.333545 respectively. In addition, HHI\_NON has a standard deviation of 0.192240. It indicates there are either banks that focus on certain non-traditional activities or banks that perfectly diversified their business into non-traditional activities.

Capital Buffer is measured by BUFF. The mean BUFF of Indonesia commercial banks is 0.221932 with a standard deviation of 0.246500. The highest amount of BUFF is 2.753800, held by Bank Bisnis International in 2015, while the lowest amounts to 0.013000 at Bank Rakyat Indonesia in 2015. A high capital buffer can provide banks with advantages in meeting regulatory requirements more easily, boosting investor confidence, and enabling the bank to absorb unforeseen losses without the risk of insolvency.

Table 2. Regression Result

FS	Small Bank All Bank		Large Bank			
	Equation 1	Equation 2	Equation 3	Equation 4	Equation 5	Equation 6
<b>HHI_REV</b>	14.576*		-3.931		4.217	
	(0.066)		(0,613)		(0,509)	
<b>HHI_NON</b>		5.674		6.507		3.277
		(0.171)		(0,100)		(0,323)
<b>BUFF</b>	10.145	32.080***	21.974	42.954***	4.662	36.171***
	(0.392)	(0.000)	(0,1971)	(0.000)	(0,655)	(0,000)
<b>RBUFF</b>	26.753*		27.120		37.549***	
	(0.057)		(0.270)		(0,002)	
<b>SIZE</b>					-5,100***	-3.760***
					(0,000)	(0,003)
<b>GROWTH</b>					-2,307*	-3.068**
					(0,093)	(0,027)
<b>LIQUIDITY</b>					2.034	-1.265
					(0,743)	(0,840)
<b>ROA</b>					41.115*	49.918**
					(0,056)	(0,022)
<b>GDP</b>					0,421	0,513
					(0,450)	(0,364)
<b>INFLATION</b>					0,514	0,486
					(0,552)	(0,579)
<b>COVID</b>					1.381	0,354
					(0,234)	(0,758)

The p-values are indicated in parentheses; (\*\*\*) : 1% significant level, (\*\*) : 5% significant level, (\*) : 10% significant level.

### Capital Buffer and Bank Stability

The analysis reveals a statistically significant positive correlation between the capital buffer (BUFF) and bank stability in Indonesian commercial banks. The capital buffer plays an important role in the stability of banks in the Indonesian commercial banking sector, especially for banks focusing on

diversifying income into non-interest income due to the volatility of this income source. The primary function of the capital buffer is to act as a cushion against unforeseen future shocks and risks. A sufficient capital buffer can enhance the confidence of both customers and investors in the bank's stability, thereby potentially improving its market value and financial performance. These results align with the research conducted by [18], which concluded that an augmentation in the capital buffer leads to an enhancement in bank stability. This aligns with the "regulatory hypothesis," whereby larger banks are required to maintain increased additional capital as buffers. This is also promulgated in Regulation OJK Number 11/POJK.03/2016 about the Commercial Banks' Minimum Capital Requirement. Banks are mandated to hold additional capital based on the level of risk they carry, in the form of Capital Conservation Buffer, Countercyclical Capital Buffer, and Capital Surcharge. Consequently, government bailouts in the event of their failure [23] might become excessively expensive. The high costs associated with preventing and managing financial system crises highlight the capital buffer's role as a macroprudential policy instrument capable of preventing banks from engaging in excessive risk-taking. Therefore, close monitoring of large banks, both internally and externally, regarding bank management is also crucial to minimize the occurrence of moral hazard that could lead to bankruptcy.

### **Revenue Diversification and Bank Stability**

The analysis reveals a positively insignificant correlation between revenue diversification (HHI\_REV) into non-traditional activities and bank stability in Indonesia's commercial banks. This correlation exists because diversification can stabilize operating income and increase bank profitability. According to [22], banks that possess less diversified portfolios and engage in riskier lending practices could face funding instability and an increase in defaults, subsequently affecting their assets and overall operational performance. They emphasize that while fee-based activities may not directly influence assets, they could still present an equity risk if they do not sufficiently cover operational expenses. Meanwhile, different results for large banks, where revenue diversification (HHI\_REV) shows a negatively insignificant correlation with bank stability. Banks with larger capital tend to be more willing to diversify their income to increase profits. However, increasing diversification into non-interest income can elevate the bank's risk as the offered products become more complex. Experts are required to manage these trading products because specialized knowledge in specific types of loan products can lead to more specialized bank services. This specialization enables banks to charge higher margins, thereby reducing the risk of bank failure. This finding agrees with [9]: when the scale of banks increases, the risk also increases due to the larger and more complicated range of products they offer, leading to increased complexity and information asymmetry. Diversification within non-interest income (HHI\_NON) also shows a positive effect on bank stability in Indonesian commercial banks. It is undeniable that the primary income of banks originates from intermediary activities. However, one of the activities that can generate profits and keep evolving is engaging in non-interest income activities. Despite the banking industry climate in Indonesia, which renders non-interest income activities less appealing compared to interest income, primarily due to the perception that non-interest income carries greater risk, whereas interest margins in Indonesia surpass those of other ASEAN

countries [9], managers must have the ability to formulate an appropriate composition for income diversification within the company. They should also optimize non-interest operational cost efficiencies, thereby enabling non-interest income activities to be more profitable and to reap the benefits derived from income diversification itself. This approach is crucial because focusing solely on interest income could heighten the bank's risk. Additionally, this research aligns with findings indicating that using income diversification techniques can enhance financial stability during both normal and crisis situations, hence confirming the validity of portfolio management theory [8].

### **Capital Buffer moderating by Revenue Diversification and Bank Stability**

The analysis revealed that the capital buffer moderated by revenue diversification (RBUFF) could significantly enhance a positive correlation with bank stability. This trend may be attributed to the reliance of large banks on interest income as their primary revenue source. In general, income diversification in Indonesian commercial banks has the potential to increase bank profits, thereby strengthening capital and enhancing bank stability.

### **Control Variable**

Bellows are an explanation of the regression analysis on control variables involved in this study.

### **Bank Specific Factors**

The analysis in this study demonstrates a statistically significant inverse correlation between bank size (SIZE) and bank stability. Larger banks are less stable compared to smaller banks all of which similarly identified a negative association between bank size and bank stability. This finding is also consistent with the 'too big to fail' theory, where banks with large assets tend to be more willing to take greater risks.

The result indicates that bank growth (GROWTH) has a negative and significant impact on bank stability. An increase in assets typically leads to a corresponding increase in liabilities, as banks are responsible for managing society's funds.

This study found a positive statistically insignificant correlation between liquidity (LIQUIDITY) and bank stability. Higher levels of liquidity were associated with lower risks. Effective liquidity management is crucial in addressing fund withdrawals, meeting loan demands, and mitigating liquidity risk.

Conversely, employing diversification within non-interest income (HHI\_NON) reveals an insignificant negative relationship between liquidity and bank stability. This is likely influenced by higher risks associated with certain non-interest income sources, the potential for excessive reliance on fee-based income and increased operational costs. If these factors are not effectively managed, they could lead to increased volatility, vulnerability to market fluctuations, and potential regulatory challenges that might undermine bank stability.

The relationship between profitability (ROA) and bank stability shows a significant positive correlation. An increased ROA indicates improved profitability and efficient asset utilization, which lowers the risk of insolvency and improved bank stability.

### **Macroeconomic Factors**

The findings indicate that the relationship between Gross Domestic Product (GDP) and bank stability in Indonesian commercial banks is statistically insignificant for both small and large banks. On the other hand, the correlation between inflation and bank stability is positive but insignificant. In situations of high inflation, loan interest rates increase, which banks can capitalize on to enhance profitability and potentially improve bank stability.

### **Dummy Variable**

The regression results indicate that the COVID-19 dummy variable has a positively insignificant impact on bank stability. This suggests that banks that generate income from diverse sources, including both interest and non-interest sources, may be more stable during the pandemic.

## **5 CONCLUSION**

This study focuses on analysing the capital buffer and revenue diversification's impact on the financial stability of commercial banks in Indonesia during the period from 2015 to 2022, involving 62 listed and non-listed commercial banks, excluding Sharia Banks and Regional Government Banks (BPD).

As expected, the capital buffer shows a positive significant correlation with bank stability. Generally, a higher capital buffer can enhance the stability of commercial banks in Indonesia, it could encounter higher risks due to the complexity of their operations and stronger connections to the financial system. Having a sufficient capital buffer can enhance the confidence of both customers and investors in the bank's stability, thereby potentially improving its market value and financial performance. Diversifying income into non-interest income has the potential to reduce the risk of bankruptcy and enhance banking stability in Indonesia, especially for small banks. However, larger banks benefit more from focusing on interest income rather than diversification. When examining the moderating effect of revenue diversification on the capital buffer and its impact on banking stability, a significantly positive relationship with banking stability is observed. This is because diversifying into non-interest income in Indonesian commercial banking has the potential to increase profits, which can be used to strengthen the bank's capital and enhance its stability.

This study suggests income diversification in Indonesian commercial banks has a positive correlation, implying that non-traditional income can enhance bank stability and reduce the risk of insolvency. However, increased diversification into non-interest income for large banks should be undertaken very carefully because it can lead to increased risk due to the growing complexity of the offered products. Experts are required to manage these trading products because specialized knowledge in specific types of loan products can lead to more specialized bank services. This specialization enables banks to charge higher margins, thereby reducing the risk of bank failure. This study also supports the implementation of strict capital requirements and the consolidation of small and medium-sized banks to improve stability of the banking industry as regulated in



POJK No 11/POJK.03/2016 and POJK No 12/POJK.03/2020. Regulators could encourage banks in Indonesia with excessive capital buffers to optimize their use of capital buffers by promoting credit disbursement to support national economic growth. For future studies, it is highly recommended to broaden the scope by analysing various types of banks beyond commercial ones such as Shariah banks, and enhancing the analysis with additional variables such as market competition and the impact of diversified loan portfolios on bank stability would further enrich the depth of the study.

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