



## Digital Receipt

This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.




The first page of your submissions is displayed below.

Submission author: Naskah Publikasi  
Assignment title: Firdha Aksari Anindynta  
Submission title: Firdha Aksari Khoirul Fuddin  
File name: 25818-Article\_Text-93382-1-10-20240213.pdf  
File size: 741.25K  
Page count: 12  
Word count: 6,080  
Character count: 36,507  
Submission date: 31-Aug-2024 09:21AM (UTC+0700)  
Submission ID: 2441659735

Jurnal Perspektif Pembayaan dan Pembangunan Daerah Vol. 11, No. 5, November - December 2023 ISSN: 2338-4603 (print); 2355-8820 (online)				
<b>How do macroeconomic variables and financial inclusion affect financial stability in Indonesia?</b>				
<b>Firdha Aksari Anindynta<sup>1</sup>; Muhammad Khoirul Fuddin</b>				
Development Economics Study Program, Faculty of Economics and Business, Universitas Muhammadiyah Malang, Indonesia				
<i>*To whom correspondence should be addressed: firdhaaksari@umm.ac.id</i>				
DOI: 10.22437/jppd.v11i5.25818	Received: 09/06/2023	Revised: 21/09/2023	Accepted: 18/10/2023	Published: 31/12/2023
<b>Abstract</b> Financial stability is a crucial indicator of the financial sector's health, reflecting the system's resilience or vulnerability to crises. This study investigates the impact of macroeconomic variables and financial inclusion on financial stability in Indonesia, utilizing quarterly data from the first quarter of 2012 to the fourth quarter of 2021. Employing the Vector Error Correction Model (VECM), the research examines the influences of these factors in both the short and long term. The findings reveal that macroeconomic variables and financial inclusion significantly affect financial stability in Indonesia across both time frames. Specifically, inflation emerges as a critical factor influencing financial stability in the long term, while interest rates play a pivotal role in the short term. Moreover, financial inclusion, represented by the public's use of banking products and third-party funds relative to Gross Domestic Product (GDP), impacts financial stability both in the long and short term. Conversely, financial inclusion, measured by credit to GDP, exhibits only short-term effects on financial stability. The results underscore the importance of careful consideration by the central bank when formulating monetary policy, particularly regarding interest rate adjustments, due to their immediate impact on financial system stability. Over the long term, maintaining control over inflation rates is imperative to safeguard financial stability. Furthermore, financial institutions, in their role of fostering financial inclusion by distributing credit, must balance the quality of credit with its quantity to avoid negative impacts on the financial system's stability. This study contributes valuable insights for policymakers and financial institutions aiming to bolster Indonesia's financial stability through prudent macroeconomic management and the strategic implementation of financial inclusion initiatives.				
<b>Keywords:</b> <i>Financial inclusion, Financial stability, Inflation, Interest rate</i>				
<b>JEL Classification:</b> G14, G32, G41				
<b>INTRODUCTION</b> The financial crisis, a recurrent phenomenon in global financial history, has impacted economies worldwide, as highlighted by Kindleberger and Aliber (2005). Indonesia, in particular, has weathered multiple economic crises, with the 1997-1998 episode marking a significant downturn. This crisis, attributed to market failures, adversely affected the nation's economy (Nurabdi et al., 2022). Financial crises pose a				

# Naskah Publikasi

## Firdha Aksari Khoirul Fuddin

 Firdha Aksari Anindynta  
 EKONOMI PEMBANGUNAN PERIODE II TAHUN 2024  
 University of Muhammadiyah Malang

---

### Document Details

Submission ID

trn:oid::1:2994418022

Submission Date

Aug 31, 2024, 9:21 AM GMT+7

Download Date

Aug 31, 2024, 9:22 AM GMT+7

File Name

25818-Article\_Text-93382-1-10-20240213.pdf

File Size

741.3 KB

12 Pages

6,080 Words

36,507 Characters





# 5% Overall Similarity

The combined total of all matches, including overlapping sources, for each database.




## Filtered from the Report

- ▶ Bibliography
- ▶ Quoted Text
- ▶ Internet sources
- ▶ Publications

## Match Groups


-  **21 Not Cited or Quoted 5%**  
Matches with neither in-text citation nor quotation marks
-  **0 Missing Quotations 0%**  
Matches that are still very similar to source material
-  **0 Missing Citation 0%**  
Matches that have quotation marks, but no in-text citation
-  **0 Cited and Quoted 0%**  
Matches with in-text citation present, but no quotation marks

## Top Sources

- 0%  Internet sources
- 0%  Publications
- 5%  Submitted works (Student Papers)

## Integrity Flags





### 1 Integrity Flag for Review

-  **Replaced Characters**  
22 suspect characters on 4 pages  
Letters are swapped with similar characters from another alphabet.




Our system's algorithms look deeply at a document for any inconsistencies that would set it apart from a normal submission. If we notice something strange, we flag it for you to review.

A Flag is not necessarily an indicator of a problem. However, we'd recommend you focus your attention there for further review.

## Match Groups

-  **21 Not Cited or Quoted 5%**  
Matches with neither in-text citation nor quotation marks
-  **0 Missing Quotations 0%**  
Matches that are still very similar to source material
-  **0 Missing Citation 0%**  
Matches that have quotation marks, but no in-text citation
-  **0 Cited and Quoted 0%**  
Matches with in-text citation present, but no quotation marks

## Top Sources

- 0%  Internet sources
- 0%  Publications
- 5%  Submitted works (Student Papers)

---

## Top Sources

The sources with the highest number of matches within the submission. Overlapping sources will not be displayed.

- 1** **Student papers**  
**Universitas Jambi** **3%**
- 2** **Student papers**  
**Universiti Malaysia Perlis** **2%**

# How do macroeconomic variables and financial inclusion affect financial stability in Indonesia?

**Firdha Aksari Anindyntha\* ; Muhammad Khoirul Fuddin**

Development Economics Study Program, Faculty of Economics and Business,  
Universitas Muhammadiyah Malang, **Indonesia**

*\*To whom correspondence should be addressed: [firdhaaksari@umm.ac.id](mailto:firdhaaksari@umm.ac.id)*

<b>DOI:</b> 10.22437/ppd.v11i5.25818	<b>Received:</b> 09.06.2023	<b>Revised:</b> 21.09.2023	<b>Accepted:</b> 18.10.2023	<b>Published:</b> 31.12.2023
---	--------------------------------	-------------------------------	--------------------------------	---------------------------------

## Abstract

Financial stability is a crucial indicator of the financial sector's health, reflecting the system's resilience or vulnerability to crises. This study investigates the impact of macroeconomic variables and financial inclusion on financial stability in Indonesia, utilizing quarterly data from the first quarter of 2012 to the fourth quarter of 2021. Employing the Vector Error Correction Model (VECM), the research examines the influences of these factors in both the short and long term. The findings reveal that macroeconomic variables and financial inclusion significantly affect financial stability in Indonesia across both time frames. Specifically, inflation emerges as a critical factor influencing financial stability in the long term, while interest rates play a pivotal role in the short term. Moreover, financial inclusion, represented by the public's use of banking products and third-party funds relative to Gross Domestic Product (GDP), impacts financial stability both in the long and short term. Conversely, financial inclusion, measured by credit to GDP, exhibits only short-term effects on financial stability. The results underscore the importance of careful consideration by the central bank when formulating monetary policy, particularly regarding interest rate adjustments, due to their immediate impact on financial system stability. Over the long term, maintaining control over inflation rates is imperative to safeguard financial stability. Furthermore, financial institutions, in their role of fostering financial inclusion by distributing credit, must balance the quality of credit with its quantity to avoid negative impacts on the financial system's stability. This study contributes valuable insights for policymakers and financial institutions aiming to bolster Indonesia's financial stability through prudent macroeconomic management and the strategic implementation of financial inclusion initiatives.

**Keywords:** *Financial inclusion, Financial stability, Inflation, Interest rate*

**JEL Classification:** G14, G32, G41

## INTRODUCTION

The financial crisis, a recurrent phenomenon in global financial history, has impacted economies worldwide, as highlighted by Kindleberger and Aliber (2005). Indonesia, in particular, has weathered multiple economic crises, with the 1997-1998 episode marking a significant downturn. This crisis, attributed to market failures, adversely affected the nation's economy (Nurabdi et al., 2022). Financial crises pose a

substantial risk to the stability of financial systems. Notably, the global economic crisis 2008, triggered by the subprime mortgage crisis in the United States, had widespread effects, including on the Indonesian economy. This period saw disturbances in both the capital and money markets, characterized by a reduction in capitalization value, trading volume of shares, foreign share ownership, as well as in the values of government securities (SUN and SBI), and a depreciation of the rupiah against the US dollar (Rusydia et al., 2019). Countries failing to uphold financial stability are particularly susceptible to economic crises. Consequently, after the 2008 global economic turmoil, Bank Indonesia took proactive measures to enforce financial stability, implementing macroprudential and microprudential policies in synergy. These policies aim to monitor and sustain financial stability, thereby minimizing the risks associated with such crises (Wahyudi et al., 2019).

Maintaining financial stability that benefits the entire community indicates positive development within a country (Iramayasi & Adry, 2020). However, financial stability lacks a universally accepted definition, leading to the understanding that a financial system becomes unstable when it poses risks to and hinders economic activities (Awanti, 2017). This ambiguity has given rise to various interpretations of Financial Stability Standards (FSS), fundamentally agreeing that instability occurs when the financial system jeopardizes and obstructs economic processes (Laksmiana & Suryadhana, 2019). Bank Indonesia (2020) articulates financial stability as a state enabling the national financial system to operate effectively and efficiently, withstand internal and external challenges, and thereby facilitate the allocation of funds or financing that supports the growth and stability of the national economy. Wiku (2021) elaborates that financial stability hinges on the robustness of financial institutions and the equilibrium of financial market conditions. A financial institution's soundness is determined by its ability to efficiently and reliably fulfil its intermediation role or other financial services, such as payment systems.

In Indonesia, financial stability is assessed through two primary indicators: microprudential and macroprudential. Microprudential indicators include capital adequacy ratios, asset quality, sound financial system management, income and bank finance, liquidity aspects, sensitivity to market risk, and various market-based indicators. Meanwhile, macroprudential indicators encompass economic growth, balance of payments, inflation rate, interest rates, exchange rates, and the potential for contagion or crisis spread, among other factors (Rusydia et al., 2019). The Finance Minister emphasizes that a stable macroeconomic environment, well-managed financial institutions, effective financial institution supervision, and a secure and reliable payment system are critical to financial stability (Wahyudi et al., 2019).

Another dimension for gauging financial stability is the effectiveness of Anti-Money Laundering (AML) regulations, particularly in Western Balkan countries. Research indicates that stringent enforcement of AML regulations positively influences banking sector stability (Durguti et al., 2023). An efficient financial system characterized by minimal macro and micro financial risks is essential for stability. A key metric for financial risk is the Non-Performing Loan (NPL) ratio, where a high ratio suggests elevated financial risk. Consequently, the NPL ratio has been employed as a proxy for financial stability in various studies, underscoring its significance in understanding and managing financial system stability (Dienillah & Anggraeni, 2016; Hardiyanto & Arianti, 2019; Viphindartin, 2021; Wiku, 2021).

Numerous factors can influence the incidence of bad loans, among which macroeconomic variables play a crucial role. Macroeconomic variables are significant because they can affect bank liquidity, thereby becoming a key determinant of the rate

of non-performing loans (NPLs) (Viphindartin, 2021). Critical macroeconomic indicators impacting financial stability include interest rates and inflation, which are instrumental in maintaining monetary stability. The importance of interest rates in the financial sector cannot be overstated, as they significantly influence decisions regarding borrowing or saving with banks. According to research by Bofondi & Ropele (2011), an increase in interest rates can deteriorate loan quality, as higher rates make it more challenging for borrowers to repay their loans, thereby increasing problem loans and adversely affecting financial stability.

Strengthening a country's financial stability can be achieved by boosting the volume of third-party funds that banks channel in public deposits, particularly those offering higher interest rates on deposits. Such deposit rates play a vital role in the stability of a country's financial system (Wiku, 2021). However, it is important to note that rising interest rates can, conversely, increase the level of non-performing loans (NPLs) within Indonesia in the short and long term (Viphindartin, 2021). This highlights the complex relationship between macroeconomic indicators and financial stability, underscoring the need for careful management and regulation of interest rates to mitigate their impact on the quality of loans and overall financial health.

Based on conventional principles, interest rates represent banks' compensation to customers who buy or sell their financial products. They can be viewed as the costs incurred by customers with deposits at the bank and, conversely, as expenses for customers who receive loans from banks (Kasmir, 2012). Essentially, the interest rate is the amount in rupiah paid as a return for the utilization of funds, wherein fluctuations in interest rates reflect changes in the demand for money or loans. An upsurge in interest rates can precipitate a reduction in aggregate demand or investment expenditure (Rompas, 2018). Furthermore, an increase in interest rates is likely to deteriorate loan quality, as higher rates tend to elevate the incidence of bad loans, impacting the financial stability of lending institutions (Messai & Jouini, 2013; Mondal, 2016; Ginting, 2017). This relationship underscores the critical influence of interest rates on both the macroeconomic environment and the individual financial health of borrowers and lenders.

Inflation is defined as a condition wherein the prices of goods and services rise continuously, attributed to the excessive circulation of money in the market relative to the available goods and services (Darmawan, 2018). According to Keynesian theory, inflation arises when people's demand for goods surpasses the available supply, indicating a lifestyle beyond their means (Santosa, 2017). This scenario, known as demand-pull inflation, is a primary cause of inflation characterized by increased demand.

Research indicates that inflation positively and significantly impacts the Non-Performing Loan (NPL) ratio; an increase in inflation correlates with an increase in the NPL ratio. Consequently, inflationary pressures adversely affect Indonesia's NPL ratio and various economic sectors (Ginting, 2017). A study by Pacini et al. (2017) investigating the impact of inflation on the stability of financial institutions in Europe found that unexpected inflationary spikes lead to cash flow difficulties for borrowers. This situation can precipitate loan losses or an increase in NPLs due to the premature termination of loan agreements. However, the relationship between inflation and the NPL ratio in banks operating in Turkey was found to be positive but not statistically significant (Isik & Bolat, 2016).

Contrastingly, several studies have identified an inverse relationship between inflation and the NPL ratio in various countries (Ekanayake & Azeez, 2015; Angela & Irina, 2015; Mondal, 2016; Saputro et al., 2019), suggesting that the effect of inflation

on financial stability and loan performance can vary significantly based on the economic context and the prevailing monetary policies implemented by the banking sector. Thus, inflation emerges as a crucial indicator for maintaining financial stability, with its impact largely contingent upon the strategic responses and policies enacted by financial authorities and institutions.

The financial sector's evolution is pivotal in influencing financial stability, particularly through expanding financial inclusion. Financial inclusion signifies the democratization of financial services, making them accessible to all societal strata, especially targeting those at the base of the economic pyramid. This group includes low-income individuals, residents of remote areas, people with disabilities, workers lacking legal identity documents, and marginalized communities traditionally excluded by the banking sector (unbanked). The emphasis on financial inclusion intensified following the 2008 financial crisis, highlighting the disproportionate impact of the crisis on these vulnerable groups, especially outside developed nations (Hardiyanto & Arianti, 2019).

Financial inclusion is the universal accessibility to a broad range of financial services at reasonable costs (Ouma et al., 2017; Swamy, 2014; Zins & Weill, 2016). It is posited to influence economic growth, alleviate poverty, reduce income inequality, and enhance financial stability, particularly in Asian countries. Financial inclusion is assessed across three dimensions: banking penetration (the extent to which banking services are widespread), access to banking services (the ease with which individuals can obtain financial services and products), and the utilization of banking services by the public (Ratnawati, 2020).

Similarly, Hanivan & Nasrudin (2019) identify three indicators encapsulating financial inclusion: availability, access, and usage. 'Availability' refers to providing banking services to the general population. 'Access' denotes the ease with which individuals can avail themselves of financial services and products. 'Usage' encompasses the extent to which the public employs banking products. These dimensions collectively underscore the significance of financial inclusion in fostering an inclusive, stable, and resilient financial system that supports broader economic objectives.

Financial inclusion in Indonesia is strategically targeted towards fostering development and growth, with its policy objectives centred on poverty reduction, enhancing financial stability, and propelling economic growth. Financial inclusion serves as a mechanism to mitigate income inequality and has the potential to bolster financial stability (Nabila & Rizki, 2018). A hallmark of quality economic development is the achievement of financial stability through the widespread implementation of financial inclusion, ensuring benefits across all societal echelons.

Empirical evidence supports the positive correlation between financial inclusion and financial stability. Morgan & Pontines (2014) have shown that increased lending to small and medium enterprises (SMEs) contributes to financial stability, as evidenced by a reduction in the Non-Performing Loan (NPL) ratio and a lowered likelihood of financial institution failure. Similarly, research by Le et al. (2019) indicates that the development of financial inclusion positively impacts financial stability. These findings collectively underscore the crucial role of financial inclusion in laying the groundwork for quality economic development, primarily through its contribution to establishing a stable financial environment. This approach not only fosters economic growth but also ensures that the benefits of such growth are equitably distributed, thereby enhancing the overall resilience of the financial sector.

This research aims to meticulously analyze the impact of macroeconomic



variables—specifically interest rates and inflation—alongside financial inclusion, as evidenced by public engagement with financial services and products, on Indonesia's short- and long-term financial stability. This investigation will utilize key financial inclusion indicators, such as the ratio of bank third-party funds (Deposits from the Public, DPK) to Gross Domestic Product (GDP) and the ratio of bank credit to GDP, to gauge the extent of financial services utilization within the economy. Through this analysis, the study aims to shed light on the intricate dynamics between macroeconomic factors, financial inclusion, and their collective influence on the resilience and stability of Indonesia's financial sector. This exploration is critical for understanding how monetary policies and the expansion of financial inclusion initiatives can contribute to sustained economic stability and growth.

**METHODS**

This methodology is classified as applied research, utilizing secondary data in a time series format. The data sources include the Indonesian Economic and Financial Statistics (SEKI) and Indonesian Financial System Statistics (SSKI), covering the period from the first quarter of 2012 to the fourth quarter of 2021. This study opts for quarterly data instead of annual aggregates to capture the nuances and dynamics of the BI 7-day repo rate, presenting more discernible quarterly variations. Additionally, the analysis considers the fluctuation in inflation rates, which can be affected by seasonal events such as religious holidays and other significant occurrences.

The analytical framework employed is the Vector Error Correction Model (VECM), which begins with testing data stability. This initial step involves assessing the stationarity of the data through a unit root test, as Gujarati (2004) outlined. The stationarity test starts at the level of data as the primary test. If data exhibit non-stationarity, further testing is conducted through first and second-order differencing.

The determination of data stationarity involves the following models:

$$\Delta Y_t = \alpha + \beta_t + \gamma Y_{t-1} + \delta_1 \Delta Y_{t-1} + \dots + \delta_k \Delta Y_{t-k} + \epsilon_t \dots\dots\dots (1)$$

Upon subtracting  $Y_{t-1}$  from both sides of Equation (1), we derive:

$$\Delta Y_t - \Delta Y_{t-1} = \alpha + (\beta - 1)_t + \gamma Y_{t-1} + \epsilon_t \dots\dots\dots (2)$$

This can also be represented as:

$$\Delta Y_t = \alpha + \beta_t + \gamma Y_{t-1} + \epsilon_t \dots\dots\dots (3)$$

Or more succinctly:

$$\Delta Y_t = \mu + \gamma Y_{t-1} + \epsilon_t \dots\dots\dots (4)$$

Based on Equation (4), hypotheses are formulated as follows:

$H_0: \beta = 1$  (The time series data is not stationary.)

$H_0: \beta < 1$  (The time series data is stationary.)

The selection of lag length is determined by the Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC), favouring the model with the lowest AIC value, with the following formula:

$$AIC = \ln\left(\frac{SSR}{n}\right) + 2 \frac{k}{n} \dots\dots\dots (5)$$

$$SIC = \ln\left(\frac{SSR}{n}\right) + \ln(n) \frac{k}{n} \dots\dots\dots (6)$$

SSR is the sum of squared residuals from the model, n is the number of observations, and k is the number of parameters in the model.

After testing for stationarity, the research proceeds with a cointegration test to

ascertain the long-term equilibrium among the observed variables. The Johansen cointegration test, utilizing trace statistics and maximum eigenvalue test statistics, sets the hypothesis as:

Hypothesis:

$H_0$  = No cointegration equations exist.

$H_1$  = At least one cointegration equation exists.

The trace statistic test determines the number of cointegration relationships among the variables. It is calculated as:

$$LR_{tr}(r|k) = -T \sum_{i=r+1}^k \log(1 - \lambda_i) \dots\dots\dots (7)$$

This formula assesses the null hypothesis of at most  $r$  cointegrating relationships against the alternative of more than  $r$  cointegrating relationships.  $T$  is the total number of observations,  $k$  is the number of variables, and  $\lambda_i$  are the eigenvalues from the cointegration test.

The maximum eigenvalue statistic test specifically looks at the significance of each cointegration relationship beyond the  $r$ th:

$$LR_{max}(r|k) = -T \log(1 - \lambda_{r+1}) \dots\dots\dots (8)$$

For  $r = 0, 1, \dots, k - 1$ , with

$\lambda_i$  = Eigen greatest value to  $-i$  from the matrix =  $(\lambda_1 \leq \lambda_2 \leq \dots \lambda_n)$

$T$  = The number of observed observations

$k$  = The number of dependent variables

The VECM test is conducted after the assessments of stationarity and cointegration. VECM represents a methodology for analyzing non-stationary variables within the Vector Autoregressive (VAR) models (Usman et al., 2017). In contemporary econometric analysis, both VAR and VECM approaches offer a means to construct relational models between economic variables non-structurally (Zou, 2018). Through VECM analysis, it becomes feasible to discern the dynamics and disturbances among variables over short and long durations. Consequently, to formulate an equation for the macroeconomic variables influencing the stability of Indonesia's financial system, a partial representation can be articulated as follows:

$$SSK = C_1 + \sum_{i=1}^k a_{1i} SB_{t-i} + \sum_{i=1}^k b_{1i} INF_{t-k} + \sum_{i=1}^k c_{1i} CR_{t-k} + \sum_{i=1}^k d_{1i} DPK_{t-k} + \epsilon_{1t} \dots (9)$$

$SSK$  represents the financial stability indicator,  $C_1$  is a constant term,  $SB$ ,  $INF$ ,  $CR$ , and  $DPK$  represent different macroeconomic variables, such as the savings balance, inflation rate, credit ratio, and deposits from the public to GDP ratio, respectively, at various lags ( $t-i$ ),  $a_{1i}$ ,  $b_{1i}$ ,  $c_{1i}$ , and  $d_{1i}$  are the coefficients for the lagged values of these variables and  $\epsilon_{1t}$  is the error term.

## RESULTS AND DISCUSSION

The initial phase of the analysis involved conducting a stationarity test or unit root test utilizing the Augmented Dickey-Fuller (ADF) test results, as illustrated in Table 1.

**Table 1.** Unit root test of variables

Variable	Level		First difference		Second difference	
	Prob.	Explanation	Prob.	Explanation	Prob.	Explanation
NPL	0.0154	Non-Stationer	0.0639	Non-Stationer	0.0000	Stationer
IR	0.7260	Non Stationer	0.0026	Stationer	0.0000	Stationer
IN	0.7459	Non Stationer	0.0000	Stationer	0.0000	Stationer
DPK	0.8863	Non Stationer	0.0000	Stationer	0.0000	Stationer
CR	0.0288	Stationer	0.4855	Non Stationer	0.0000	Stationer

The ADF Test results, with a Prob value of <0.05, indicate stationarity, meaning the data does not contain a unit root. The test was conducted from the level up to the second difference. Most variables reached stationarity at the second difference.

Following the stationarity test, the next critical step in the analysis is the cointegration test (Table 2). Cointegration tests are pivotal in understanding the long-term relationships among variables. Specifically, this test determines whether a set of non-stationary series are cointegrated, meaning they share a long-term equilibrium relationship despite being individually non-stationary.

**Table 2.** The result of the cointegration test

	Eigenvalue	Trance statistic	0.05 Critical value	Probability
None *				
At most 1 *	0.791885	115.3303	63.87610	0.0000
At most 2 *	0.643194	61.96164	42.91525	0.0002
At most 3 *	0.362696	26.92248	25.87211	0.0369
At most 4	0.289175	11.60518	12.51798	0.0707

The Johansen Trace Statistic test results indicate long-term cointegration among the variables, as the trace statistic exceeds the critical value. This suggests that the variables influence each other in the long term, denoted by the asterisks. Therefore, after achieving stationarity at the second difference level and confirming cointegration, the VECM is appropriate for model estimation.

After establishing the presence of cointegration among the variables, the Granger causality test is employed to examine the directionality of relationships between pairs of variables (Table 3). This test is fundamental in econometric analysis as it helps identify whether one variable can predict another.

**Table 3.** Granger causality test results

Null Hypothesis:	Obs	F-Statistic	Prob.
SB does not Granger Cause SSK	36	1.70818	0.1773
SSK does not Granger Cause SB		3.38484	0.0228
INF does not Granger Cause SSK	36	0.76173	0.5593
SSK does not Granger Cause INF		1.93500	0.1334
DPK does not Granger Cause SSK	36	0.93148	0.4605
SSK does not Granger Cause DPK		2.77245	0.0474
CR does not Granger Cause SSK	36	8.23564	0.0002
SSK does not Granger Cause CR		2.53421	0.0634
INF does not Granger Cause SB	36	1.98041	0.1260
SB does not Granger Cause INF		0.90047	0.4775
DPK does not Granger Cause SB	36	0.63315	0.6432
SB does not Granger Cause DPK		1.30268	0.2940
CR does not Granger Cause SB	36	2.01782	0.1202
SB does not Granger Cause CR		0.47191	0.7559
DPK does not Granger Cause INF	36	0.93261	0.4599
INF does not Granger Cause DPK		1.29362	0.2973
CR does not Granger Cause INF	36	2.72685	0.0501
INF does not Granger Cause CR		0.27055	0.8943
CR does not Granger Cause DPK	36	1.66419	0.1873
DPK does not Granger Cause CR		2.23727	0.0914

Notes: Pairwise Granger Causality Tests; Sample: 2012M01 2021M12; Lags: 4

The Granger Causality Test reveals the directional influence between variables over the sample period from January 2012 to December 2021 with 4 lags. The test results help identify causal relationships between variables, indicated by the F-Statistic and corresponding probabilities. Significant p-values (Prob. < 0.05) suggest the presence of Granger causality, indicating a predictive relationship between the pairs of variables tested.

Furthermore, the VECM analysis offers comprehensive insights into how selected variables influence the financial stability system in Indonesia, distinguishing between short-term and long-term impacts. The results, summarized in Table 4, reveal these variables' differential effects on financial stability over distinct time horizons.

**Table 4.** The result of VECM

Variable	Coefficient	t-statistic
Long term		
D(IN(-1))	0.058919	3.48321
D(DPK(-1))	-0.190734	-14.8983
Short term		
CointEq1	-1.072641	-2.01034
D(SB(-1),2)	-0.296306	-3.11136
D(CP(-3),2)	0.255140	3.29269
D(DPK(-3)-2)	-0.098188	-2.11329

The VECM analysis offers a comprehensive examination of the nuanced relationship between key economic variables and the financial stability system in Indonesia, elucidating both short-term and long-term impacts. Initially focusing on the long-term effects, the analysis reveals a positive influence of inflation (D(IN(-1))) on financial stability, as evidenced by a coefficient of 0.058919 and a significant t-statistic of 3.48321. This positive relationship suggests that contrary to conventional wisdom, sustained inflationary pressures may, under certain conditions, contribute positively to the financial system's resilience. However, this finding also implies that an unchecked increase in inflation could disrupt financial stability by eroding purchasing power and increasing the risk of defaults, as businesses reliant on bank loans may face heightened default risks, leading to an increase in the Non-Performing Loan (NPL) ratio and subsequent financial instability. This insight aligns with Ginting's (2017) and Viphindrartin's (2021) findings, which indicate that inflation elevates the NPL ratio. It contrasts with other research, such as Saputro et al. (2019), which posits a negative impact of inflation on financial stability.

Conversely, the deposits from the public (DPK) exhibit a negative long-term effect on financial stability, with a coefficient of -0.190734 and a notably significant t-statistic of -14.8983. This relationship underscores the potentially destabilizing effect of rapid increases in bank deposits on the financial system over the long term.

In the short-term analysis, the responsiveness of the financial system to deviations from stability is highlighted through the error correction term (CointEq1), which boasts a coefficient of -1.072641 and a t-statistic of -2.01034, signifying a robust mechanism for re-adjusting to long-term equilibrium. Furthermore, short-term fluctuations are influenced negatively by changes in the savings balance (SB) and deposits from the public (DPK), as shown by their coefficients and significant t-statistics, indicating these variables' capacity to induce short-term financial system fluctuations. Conversely, a positive short-term impact of consumer prices (CP) on financial stability, with a coefficient of 0.255140 and a t-statistic of 3.29269, may reflect periods of increased consumer confidence or spending that bolster the financial sector momentarily..

The long-term positive effect of inflation on the financial stability system, as discussed, implies that rising inflation levels can disrupt financial stability by diminishing the aggregate purchasing power, which, in turn, could lead to a decline in business income for those operating with capital from bank loans. This scenario increases the default risk, escalating the bank's NPL ratio and creating financial instability, a situation corroborated by Ginting (2017) and Viphindartin (2021). However, this stands in contrast to the findings of Saputro et al. (2019), which suggest an inverse relationship between inflation and financial stability.

Regarding third-party funds, both in the short and long term, the variable negatively affects the financial stability system. Increasing third-party funds could lower the NPL ratio, fostering financial stability. An uptick in the TPF-to-GDP ratio signifies a rising savings rate, which acts as a capital stock in the economy for investment and lending purposes. Financial institutions, aiming not just for quantity but also quality in lending, become more selective in extending loans to minimize bad loan risks, thus enhancing financial stability. This effect of increasing financial inclusion through third-party funds on financial stability in Indonesia is supported by Syaputra & Adry (2019), who assert that an increase in third-party funds signifies a healthy banking sector, as the public chooses to entrust their funds to financial institutions, thereby inducing financial stability and impacting the national economy positively.

In short-term effects, the analysis presents a more complex picture. The negative impact of interest rates on the financial stability system in the short term suggests that decreasing interest rates could disrupt financial stability. This finding diverges from existing research and theories, which typically highlight a positive relationship between interest rates and the NPL ratio. However, this study's results align with Pertiwi et al. (2020), illustrating that a reduction in the BI rate does not always lead to decreased lending rates. This situation, mirroring the findings of Ahmad & Bashir (2013), underscores a negative relationship between interest rates and the NPL ratio because lower interest rates encourage borrowing for consumption and investment in risky projects, thereby increasing the likelihood of defaults and contributing to financial instability. Similarly, the positive effect of banking credit on financial stability in the short term, where loan growth corresponds with an increase in the NPL ratio, emphasizes the critical balance between credit expansion and loan quality. This relationship is echoed by Viphindartin (2021) and Saputro et al. (2019), who also found a positive effect of bank credit on NPL, contrasting with Kusuma & Haryanto (2016), which suggested that increased credit could reduce bad loans, thereby implying different impacts on financial stability.

## CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

This study has illuminated the complex dynamics between macroeconomic variables, namely interest rates and inflation, and their respective impacts on financial stability in Indonesia. It highlights that while inflation exerts its influence over the long term, interest rates predominantly affect financial stability in the short term. This distinction underlines the necessity for monetary authorities and the government to collaborate closely to manage the inflation rate effectively, adhering to long-term inflation-targeting strategies to ensure stability and avert disruptions to the financial system. Moreover, the BI rate, serving as the benchmark for deposit and loan rates, demands cautious adjustment in the short term to prevent adverse impacts on financial stability.

Furthermore, the study underscores the significance of financial inclusion, particularly the utilization of banking products by the public and the role of third-party funds as a proxy for GDP in fostering financial stability across both short-term and long-term horizons. Financial institutions are thus encouraged to enhance their promotional efforts and improve service quality to boost public confidence in banking, thereby contributing to greater financial stability. It is also noted that the credit variable exhibits a short-term effect on financial stability, emphasizing the need for prudent credit management.

### Recommendations

Future research can build upon the findings of this study by exploring more sophisticated models, particularly structural models that incorporate theoretical advancements through the application of constraints. Additionally, the assessment of financial stability could benefit from a broader set of measures beyond the non-performing loan ratio, including the bank's z-score or other relevant indicators, to provide a more comprehensive understanding of financial health. The exploration of financial inclusion could also be enriched by incorporating additional indicators that reflect the availability and accessibility of financial services, offering deeper insights into the mechanisms through which financial inclusion can influence stability.

### REFERENCES

- Ahmad, F., & Bashir, T. (2013). Explanatory power of macroeconomic variables as determinants of non-performing loans: Evidence from Pakistan. *World Applied Sciences Journal*, 22(2), 243–255. <https://doi.org/10.5829/idosi.wasj.2013.22.02.1863>
- Angela, R., & Irina, B. (2015). An empirical analysis of the macroeconomic determinants of non-performing loans in EU28 banking sector. *Revista Economică*, 67(2), 108–127.
- Awanti, E. (2017). Analisis pengaruh inklusi keuangan terhadap stabilitas sistem keuangan di negara berkembang kawasan Asia Tenggara. *Jurnal Ilmu Ekonomi Terapan*, 2(2). <https://doi.org/10.20473/jiet.v2i2.6080>
- Bofondi, M., & Ropele, T. (2011). Macroeconomic determinants of bad loans: Evidence from Italian banks. *No 89, Questioni di Economia e Finanza (Occasional Papers)*. Bank of Italy, Economic Research and International Relations Area
- Gujarati, D. N. (2004). *Basic econometrics* (4th ed.). The McGraw-Hill Companies.
- Darmawan, A. (2018). Influence of loan interest rate, non-performing loan, third party fund and inflation rate towards micro, small and medium enterprises (MSME) credit lending distribution at commercial banks in Indonesia. *Proceedings of the 2018 International Conference on Advanced Material Engineering & Technology (AMCA)*, 231, 308–311. <https://doi.org/10.2991/amca-18.2018.84>
- Dienillah, A. A., & Anggraeni, L. (2016). Dampak inklusi keuangan terhadap stabilitas sistem keuangan di Asia. *Buletin Ekonomi Moneter dan Perbankan*, 18(4), 409–430. <https://doi.org/10.21098/bemp.v18i4.574>
- Durguti, E., Arifi, E., Gashi, E., & Spahiu, M. (2023). Anti-money laundering regulations' effectiveness in ensuring banking sector stability: Evidence of Western Balkan. *Cogent Economics & Finance*, 11(1). <https://doi.org/10.1080/23322039.2023.2167356>
- Ekanayake, N., & Azeez, A. A. (2015). Determinants of non-performing loans in licensed commercial banks: Evidence from Sri Lanka. *Asian Economic and Financial Review*, 5(6), 868–882.

- <https://doi.org/10.18488/journal.aefr/2015.5.6/102.6.868.882>
- Ginting, A. M. (2017). Pengaruh makroekonomi terhadap non performing loan (NPL) di Indonesia: Studi non performing loan perbankan. *Jurnal Ekonomi dan Kebijakan Publik*, 7(2), 159. <https://doi.org/10.22212/jekp.v7i2.669>
- Hanivan, H., & Nasrudin, N. (2019). A financial inclusion index for Indonesia. *Buletin Ekonomi Moneter dan Perbankan*, 22(3), 351–366. <https://doi.org/10.21098/bemp.v22i3.1056>
- Hardiyanto, Y. P., & Arianti, F. (2019). Pengaruh inklusi keuangan terhadap stabilitas sistem keuangan (Studi kasus: Selected Asia developing countries tahun 2011-2016). *Jurnal Dinamika Ekonomi Pembangunan*, 2(2), 1–19. <https://doi.org/10.14710/jdep.2.2.1-19>
- Iramayasi, I., & Adry, M. R. (2020). Pengaruh inklusi keuangan terhadap stabilitas sistem keuangan dan pertumbuhan ekonomi di ASEAN. *Jurnal Kajian Ekonomi Pembangunan*, 2(1), 161–176.
- Isik, O., & Bolat, S. (2016). Determinants of non-performing loans of deposit banks in Turkey. *Journal of Business, Economics and Finance*, 5(4), 341–350. <https://doi.org/10.17261/pressacademia.2017.356>
- Kasmir. (2012). *Bank dan lembaga keuangan lainnya*. Raja Grafindo Persada.
- Kindleberger, C. P., & Aliber, R. Z. (2005). *Manias, panics, and crashes: A history of financial crises*. John Wiley & Sons, Inc.
- Kusuma, E. C., & Haryanto, A. M. (2016). Analisis pengaruh variabel kinerja bank (CAR, ROA, BOPO, dan LDR), serta pertumbuhan kredit dan kualitas kredit terhadap non performing loan (NPL). *Diponegoro Journal of Management*, 5(2015), 1–13.
- Laksmiana, K. A. R. I., & Suryadhana, N. A. (2019). Dampak pertumbuhan inklusi keuangan terhadap stabilitas sistem keuangan di Indonesia. In *INA-Rxiv Papers*. Retrieved from <https://osf.io/preprints/inarxiv/vkax8/>
- Le, T. H., Chuc, A. T., & Taghizadeh-Hesary, F. (2019). Financial inclusion and its impact on financial efficiency and sustainability: Empirical evidence from Asia. *Borsa Istanbul Review*, 19(4), 310–322. <https://doi.org/10.1016/j.bir.2019.07.002>
- Messai, A. S., & Jouini, F. (2013). Micro and macro determinants of non performing loans. *Journal of Economics and Financial Issues*, 2(4), 852–860.
- Mondal, T. (2016). Sensitivity of non-performing loan to macroeconomic variables: Empirical evidence from banking industry of Bangladesh. *Global Journal of Management and Business Research: C Finance*, 16(4).
- Morgan, P. J., & Pontines, V. (2014). Financial stability and financial inclusion. Retrieved from [https://doi.org/10.1007/978-1-349-67278-3\\_116](https://doi.org/10.1007/978-1-349-67278-3_116)
- Nabila, F., & Rizki, Z. C. (2018). Analisis kebijakan inklusi keuangan di Indonesia. *Jurnal Ilmiah Mahasiswa (JIM)*, 3(2), 193–203.
- Nurabdi, M., Inst, E., & Usional, I. T. (2022). *AkMen*. *AkMen*, 17(1), 90–98.
- Pacini, K., Berg, D., Tischer, T., & Johnson, J. (2017). An empirical investigation of macroeconomic factors on firm performance in the United Kingdom. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3013944>
- Pertiwi, R. E., Syaukat, Y., & Rachmina, D. (2020). Faktor yang memengaruhi kredit bermasalah bank konvensional dan syariah di Indonesia. *Jurnal Aplikasi Bisnis dan Manajemen*, 6(1), 118–127. <https://doi.org/10.17358/jabm.6.1.118>
- Ratnawati, K. (2020). The impact of financial inclusion on economic growth, poverty, income inequality, and financial stability in Asia. *The Journal of Asian Finance, Economics and Business*, 7(10), 73–85. <https://doi.org/10.13106/jafeb.2020.vol7.no10.073>

- Rompas, W. F. I. (2018). Analisis pengaruh tingkat suku bunga dan nilai tukar terhadap permintaan kredit pada perbankan di Kota Manado. *Jurnal Berkala Ilmiah Efisiensi*, 18(2), 204–215.
- Rusydiana, A. S., Rani, L. N., & Hasib, F. F. (2019). Manakah indikator terpenting stabilitas sistem keuangan?: Perspektif makroprudensial. *Jurnal Ekonomi Pembangunan*, 27(1), 25–42. <https://doi.org/10.14203/jep.27.1.2019.25-42>
- Santosa, A. B. (2017). Analisis inflasi di Indonesia. *Prosiding Seminar Nasional Multi Disiplin Ilmu & Call Papers UNISBANK Ke-3 (SENDI\_U 3) 2017*, 445–452.
- Saputro, A. R., Sarumpaet, S., & Prasetyo, T. J. (2019). Analisa pengaruh pertumbuhan kredit, jenis kredit, tingkat bunga pinjaman bank dan inflasi terhadap kredit bermasalah. *Ekspansi: Jurnal Ekonomi, Keuangan, Perbankan dan Akuntansi*, 11(1), 1. <https://doi.org/10.35313/ekspansi.v11i1.1325>
- Setya Wijaya, R. (2019). Pengaruh faktor makro ekonomi terhadap kredit bermasalah pada bank umum di Indonesia. *OECONOMICUS Journal of Economics*, 4(1), 36–48. <https://doi.org/10.15642/oje.2019.4.1.36-48>
- Syaputra, R., & Adry, M. R. (2019). Pengaruh variabel makroekonomi terhadap stabilitas sistem keuangan di Indonesia (Melalui pendekatan moneter). *Jurnal Kajian Ekonomi dan Pembangunan*, 1(2), 473. <https://doi.org/10.24036/jkep.v1i2.6257>
- Usman, M., Fatin, D. F., Barusman, M. Y. S., Elfaki, F. A. M., & Widiarti. (2017). Application of vector error correction model (VECM) and impulse response function for analysis data index of farmers' terms of trade. *Indian Journal of Science and Technology*, 10(19), 1–14. <https://doi.org/10.17485/ijst/2017/v10i19/112258>
- Utami, D. A. (2020). Pengaruh profitabilitas, kecukupan modal, dana cadangan dan tingkat suku bunga terhadap kredit bermasalah pada bank umum konvensional yang terdaftar di Bursa Efek Indonesia tahun 2014-2017. *Jurnal Manajemen dan Bisnis*, 8(2).
- Viphindartin, S. (2021). Dampak makro ekonomi terhadap stabilitas keuangan di Indonesia. *Jurnal Manajemen Jayanegara*, 13(1), 13–19. <https://doi.org/10.52956/jmj.v13i1.27>
- Wahyudi, S. T., Nabella, R. S., & Badriyah, N. (2019). Analisis pengaruh siklus keuangan terhadap stabilitas sistem keuangan di Indonesia. *Jurnal Ekonomi dan Bisnis*, 20(2), 87–95. <https://doi.org/10.30659/ekobis.20.2.87-95>
- Wiku, F. (2021). Determinan stabilitas sistem keuangan di Indonesia melalui pendekatan makroekonomi. *Jurnal Ekonomi dan Bisnis*, 16(2), 214–237.
- Zou, X. (2018). VECM model analysis of carbon emissions, GDP, and international crude oil prices. *Discrete Dynamics in Nature and Society*, 2018. <https://doi.org/10.1155/2018/5350308>



© 2023 by the authors. Licensee JPPD, Indonesia. This article is an open-access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).