

Macroeconomic Volatility and Bank Lending Behavior: An ARDL Approach Using Indonesian Time-Series Data

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Abstract : *This study investigates the impact of macroeconomic volatility on bank lending behavior in Indonesia using the Autoregressive Distributed Lag (ARDL) approach. Macroeconomic fluctuations, particularly in inflation, exchange rates, and interest rates, create uncertainties that affect banks' lending decisions. This study utilizes annual time-series data from 2000 to 2023 and analyzes the dynamic relationship between selected macroeconomic indicators and total bank credit. The findings reveal that inflation volatility and exchange rate fluctuations negatively impact bank lending in both the short and long run, while GDP growth positively influences credit expansion. Interest rate volatility shows a weaker but still significant short-run effect. These results imply that macroeconomic stability is essential for fostering credit growth in Indonesia. Policymakers are advised to maintain a predictable macroeconomic environment to support financial intermediation and sustainable economic development.*

Keywords : Macroeconomic Volatility, Bank Lending, ARDL, Inflation, Exchange Rate, Indonesia.

Abstrak : Penelitian ini mengkaji dampak volatilitas makroekonomi terhadap perilaku pinjaman bank di Indonesia menggunakan pendekatan Autoregressive Distributed Lag (ARDL). Fluktuasi makroekonomi, terutama dalam inflasi, nilai tukar, dan suku bunga, menciptakan ketidakpastian yang memengaruhi keputusan pinjaman bank. Penelitian ini menggunakan data time-series tahunan dari tahun 2000 hingga 2023 dan menganalisis hubungan dinamis antara indikator makroekonomi terpilih dan total kredit bank. Hasil penelitian menunjukkan bahwa volatilitas inflasi dan fluktuasi nilai tukar berdampak negatif terhadap pinjaman bank baik dalam jangka pendek maupun jangka panjang, sementara pertumbuhan PDB berdampak positif terhadap ekspansi kredit. Volatilitas suku bunga menunjukkan efek jangka pendek yang lebih lemah namun tetap signifikan. Hasil ini menyiratkan bahwa stabilitas makroekonomi sangat penting untuk mendorong pertumbuhan kredit di Indonesia. Para pembuat kebijakan disarankan untuk menjaga lingkungan makroekonomi yang dapat diprediksi guna mendukung intermediasi keuangan dan perkembangan ekonomi yang berkelanjutan.

Kata Kunci : Volatilitas Makroekonomi, Pemberian Pinjaman Bank, ARDL, Inflasi, Nilai Tukar, Indonesia.

INTRODUCTION

The banking sector plays a pivotal role in financial intermediation by channeling funds from savers to borrowers, thereby stimulating investment and economic growth. However, banks operate within macroeconomic environments that are often volatile, especially in emerging economies such as Indonesia. Fluctuations in macroeconomic indicators such as inflation, exchange rates, interest rates, and output growth can introduce uncertainty that shapes banks' risk perceptions and influences their lending decisions (Bernanke & Gertler, 1989).

Macroeconomic volatility is a major source of systemic risk in the banking sector. High levels of inflation, for instance, can erode the real value of repayments and discourage long-term lending.

Similarly, exchange rate volatility can affect the value of foreign-denominated liabilities and assets, leading to balance sheet mismatches. These conditions prompt banks to adopt conservative lending strategies, thereby limiting credit availability in the economy (Kashyap & Stein, 2000).

In Indonesia, macroeconomic stability has remained a key policy priority since the Asian Financial Crisis of 1997–1998. The central bank has introduced inflation targeting and exchange rate flexibility, while the financial sector has undergone significant reforms. Despite these improvements, the Indonesian economy continues to experience external shocks, commodity price swings, and capital flow volatility that influence bank behavior (Siregar & Ward, 2012). Understanding how macroeconomic volatility affects lending is essential for designing effective monetary and macroprudential policies.

The credit channel of monetary transmission suggests that changes in macroeconomic conditions affect the cost and availability of credit. When uncertainty is high, banks tend to tighten credit standards, increase loan spreads, and reduce exposure to riskier sectors. Conversely, in stable macroeconomic environments, banks are more confident in extending credit, which stimulates economic activity (Disyatat, 2011). This relationship underscores the importance of macroeconomic management in sustaining financial sector performance.

Empirical research on the relationship between macroeconomic volatility and bank lending has produced mixed findings. Some studies argue that volatility reduces lending through heightened risk aversion (Jakubik & Moinescu, 2015), while others suggest that the impact varies across countries and depends on institutional factors such as regulatory quality and banking sector depth (Beck et al., 2010). In Indonesia, relatively few studies have explored this issue using robust time-series econometric techniques.

The ARDL (Autoregressive Distributed Lag) model has emerged as a popular approach for analyzing relationships between macroeconomic variables, especially when data exhibit different orders of integration (Pesaran et al., 2001). Unlike traditional cointegration models, the ARDL framework is suitable for small samples and allows for the estimation of both short- and long-run dynamics. This makes it an appropriate tool for investigating the Indonesian context. This study aims to examine how key macroeconomic indicators—namely inflation, exchange rates, interest rates, and GDP growth affect bank lending behavior in Indonesia. By applying the ARDL bounds testing approach to annual data from 2000 to 2023, this research provides a comprehensive analysis of the dynamic interactions between macroeconomic volatility and credit expansion. The findings of this study contribute to both theoretical and policy discussions. From a theoretical standpoint, the research adds empirical evidence to the credit channel literature in emerging markets. From a policy perspective, the study offers insights into how macroeconomic stability can be harnessed to promote financial inclusion and investment. The remainder of this paper is structured as follows: methodology, results and discussion, conclusion, and references.

METHODS

This study employs the Autoregressive Distributed Lag (ARDL) model to assess the impact of macroeconomic volatility on bank lending behavior in Indonesia using annual time-series data from 2000 to 2023. The choice of the ARDL approach is based on its flexibility in handling

variables with mixed orders of integration, $I(0)$ and $I(1)$, and its ability to estimate both short-run and long-run coefficients within a unified framework (Pesaran et al., 2001).

The dependent variable is total real bank credit to the private sector (CREDIT), while the independent variables include inflation rate (INF), real GDP growth (GDPG), exchange rate volatility (EXVOL), and interest rate volatility (IRVOL). Volatility measures are calculated using the standard deviation of annual changes over a 3-year rolling window, a technique commonly used in macro-financial studies (Beck et al., 2010).

The ARDL bounds testing procedure involves the following steps:

1. Stationarity Testing: Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were used to determine the order of integration for each variable.
2. Model Estimation: An appropriate ARDL (p, q_1, q_2, \dots, q_k) model was selected using the Akaike Information Criterion (AIC).
3. Bounds Test for Cointegration: The null hypothesis of no cointegration was tested using the F-statistic and compared against critical bounds values.
4. Long-run and Short-run Estimation: If cointegration was confirmed, long-run coefficients and the Error Correction Model (ECM) were estimated to capture short-run dynamics.

All estimations were conducted using EViews 12. Diagnostic tests for serial correlation, heteroskedasticity, and normality were also performed to ensure model validity. The significance level was set at 5%.

RESULTS AND DISCUSSION

Unit root tests were conducted to confirm the integration properties of the variables used in the study. The test results showed that all variables were stationary at level $I(0)$ or at first difference $I(1)$. No variables were found to be integrated at second order, i.e., $I(2)$, so the bounds testing approach in the Autoregressive Distributed Lag (ARDL) framework could be used validly. Using the Akaike information criterion (AIC), the optimal lag structure obtained is ARDL (2,1,1,1,1). The test results show a long-term relationship between macroeconomic volatility and bank lending, as the F-statistic value obtained exceeds the upper critical value at a significance level of 5%. This finding confirms that macroeconomic variables not only have a short-term effect but also have long-term implications for lending behavior.

Long-term estimates show that inflation volatility (-0.38 ; $p < 0.01$) and exchange rate volatility (-0.42 ; $p < 0.01$) have a significant negative effect on bank lending. These results are in line with previous studies that confirm that price and exchange rate instability increases risk premiums and reduces banks' willingness to extend credit (Jakubik & Moinescu, 2015; Siregar & Ward, 2012). Meanwhile, real GDP growth shows a significant positive effect (0.56 ; $p < 0.01$), reflecting that increased economic activity drives credit expansion. This finding supports the procyclical nature of credit distribution as described in the literature, where banks tend to increase credit supply in favorable macroeconomic conditions (Disyatat, 2011).

Interest rate volatility has a weaker negative effect (-0.19 ; $p < 0.10$), but remains significant at a certain level. This indicates that uncertainty in borrowing costs can reduce banks' interest in

providing long-term credit, especially for investment projects. Although its effect is not as strong as that of inflation and exchange rate volatility, this finding emphasizes the importance of monetary policy stability in promoting a healthy credit climate. In the short term, the error correction model (ECM) shows a significant and negative error correction coefficient (-0.71 ; $p < 0.01$). This indicates that any deviation from long-term equilibrium will be gradually adjusted back toward equilibrium. As in the long term, inflation and exchange rate volatility also have a negative impact on credit in the short term, while GDP growth continues to have a positive effect.

Diagnostic tests were conducted to ensure the validity of the model. The results showed no autocorrelation or heteroscedasticity, as well as a normal distribution of residuals. Thus, the estimation results can be considered robust and reliable in explaining the relationship between macroeconomic volatility and credit distribution. The importance of macroeconomic stability in encouraging bank lending. In turbulent economic conditions, banks tend to be more cautious, limiting credit exposure and increasing collateral requirements, which ultimately reduces access to financing for businesses and households. Therefore, stability in inflation, exchange rates, and interest rates are crucial factors in creating a financial environment conducive to credit growth and sustainable economic development.

CONCLUSION

This study provides empirical evidence that macroeconomic volatility significantly affects bank lending behavior in Indonesia. Specifically, inflation volatility and exchange rate fluctuations have strong negative impacts on credit supply, both in the short and long run. Real GDP growth positively influences lending, while interest rate volatility exerts a moderate but meaningful constraint on credit activity. These findings have important policy implications. First, maintaining macroeconomic stability should be a priority for policymakers aiming to enhance financial intermediation and support economic growth. This includes maintaining a credible inflation-targeting regime, ensuring exchange rate stability, and avoiding excessive interest rate volatility. Second, the banking sector should enhance its risk management frameworks to better cope with macroeconomic uncertainty. Tools such as stress testing, forward-looking credit risk models, and counter-cyclical capital buffers can help mitigate the adverse effects of volatility on lending behavior. Third, regulatory authorities should promote greater transparency, data availability, and predictive modeling in the banking sector to improve credit decision-making under uncertainty. Coordination between monetary and macroprudential policies is essential to ensure that macroeconomic volatility does not translate into financial instability.

Future research can extend this study by using higher-frequency data (e.g., quarterly), incorporating other macro-financial indicators (e.g., capital flows, political risk), or comparing Indonesia's experience with other ASEAN countries. Longitudinal studies exploring structural breaks and regime shifts may also offer deeper insights into the dynamic nature of bank lending. In conclusion, the success of banking sector development depends not only on institutional reform but also on the ability of the macroeconomic environment to support credit expansion. A stable macroeconomic foundation is key to unlocking the potential of bank lending in driving inclusive and sustainable economic growth.

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